THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW

Vol. LX Cleveland, March 15, 1917 *No. 11*

Buyers Snatch at Higher Prices

Advanced Quotations on Raw and Finished Materials Have No Perceptible Effect on the Demand—Great Activity in Pig Iron and Finished Steel Products

WITH the assurance of a trained aviator on a calm, clear day, iron and steel prices continue their steady flight to unprecedented levels. During the past week, quotations have been marked up all along the line. As the country stands breathless, awaiting the eventualities of armed neutrality, there is no hesitancy in the industrial arena. Supply and demand are the supreme dictators of the hour and demand, at present, has so far outrun supply, that viewed from the consumer's angle, the situation might readily become catastrophic. In normal times, prevailing conditions would inhibit further commitments, but the pressure for tonnage is now so great that buyers are willing to make contracts for 1918 delivery of fundamentally important supplies, such as pig iron.

Finished Materials

The plate market is still the feature of the steel situation. A prominent eastern manufacturer has again boosted prices $10 a ton, making a total advance of $20 in two weeks. The demand for plates is simply tremendous. Additional boats which have been placed with Atlantic coast ship builders will require large tonnages. Fully 100,000 tons of plate business was offered during the past week. The structural market also is active. Government structural work already closed or about to be bid upon aggregates 50,000 tons. The price increases of the past week have had virtually no effect on the volume of specifications. Bars are active. Agricultural implement makers continue to place business in small lots in the Chicago district for 1918 delivery. Hard steel bars and bar iron have advanced in sympathy with the increased price of soft steel.

Pig Iron

Pig iron prices have joined the upward swing. Basic is $2 higher, bessemer $1 and foundry and malleable $1, in the Pittsburgh district. These advances bring basic and bessemer to $32 and $37, respectively. In the east, Virginia furnaces are quoting No. 2 foundry at $32. In eastern Pennsylvania, at least 2,500 tons of the same grade have been sold for the first half of next year at $33, furnace. Chicago furnaces are asking $35.50, furnace, for No. 2 foundry. In the south, prices are hardening toward $30, Birmingham. Sales of spot southern No. 2 foundry have recently been made, however, at $27, Birmingham, in the Cincinnati market. There is unusual activity in basic. A Youngstown company has sold 5,000 tons at $32, valley, and pending inquiries in the valley and Pittsburgh districts aggregate nearly 50,000 tons. An eastern steelmaker has purchased 40,000 tons of basic for last quarter shipment at an average of $33.80, delivered. At New York, pig iron buyers are worrying over the threatened railroad strike. Freight embargoes also are a cause of trouble. Only one route from Virginia to New England remains open.

Price Advances

A complete summary of the price advances of the week under review would include virtually all iron and steel products. On Thursday, the Corporation announced advances on plates, shapes and bars, bringing these products to 4.50c, 3.60c and 3.35c, Pittsburgh, respectively, for delivery at the convenience of the mill. These advances were followed, or preceded, by, increases of $5 a ton on black sheets, $3 on galvanized sheets, $5 on blue annealed sheets, $4 on tubular goods, $10 on structural and boiler rivets, $4 on wire products, $10 on steel chain, $5 on light rails, $2 on railroad spikes and $5 on tie plates. It is interesting, also, to note just at this time, when final arguments are being heard in the Steel Corporation dissolution suit, that the independents do not appear to be following their leader. Eastern independent plate, bar and shape mills, pursuing their own ideas as to prices, are quoting 3.50c, Pittsburgh, on bars, 3.75c on shapes and up to 7.50c for ship plates. They are taking business at these figures only when the buyers are not unduly insistent on the deliveries.

THE OPEN HEARTH

Red Signs in Pig Iron

SOME danger signals have begun to appear in the pig iron market. Certain buyers deeply stirred by the sharply rising prices and by the shrinking unsold tonnage for delivery during the current year have started to come into the market for metal to be shipped over the first six months of 1918. In a number of cases, purchases have been made. This buying represents an effort to diagnose possible business conditions 12 to 15 months ahead. It represents an extension of future buying in pig iron seldom witnessed in the past.

Obviously the element of speculation in the making of obligations for raw material to be consumed so far in the future is large. What the iron market as trade conditions may prove to be one year or more from this date is altogether a matter of guess. That the furnaces are in a doubtful position is indicated by their willingness to accept prices $4 to $5 a ton below those they have been asking for the last half of 1917 and by their reluctance to encourage buyers to cover where the latter have shown a receptive mood. Numerous consumers, after having come into the market for next year, have been backing and filling, apparently in serious doubt whether or not to close. A considerable portion of them, nevertheless, have taken the plunge. Most of this has been in foundry iron.

It is not difficult to apprehend the hazards in such buying for the average jobbing foundry. It is impossible for the foundryman to figure with any degree of assurance on what the market for castings is likely to be twelve months ahead. For him to engage his principal item of cast, pig iron, at prices so extravagantly high and in a market so dominated by conditions necessarily of the most extraordinary and temporary character as at present, is to stake a large share of his present profits and perhaps to invite disaster. His signature once affixed to a contract obligates him to take the metal at the stipulated price. Repudiations of contracts have been comparatively few in the pig iron trade. In this respect they show to great advantage over the average contract for steel. Buyers of steel-making iron, because of the liberal and irrevocable sales of product for next year at prevailing prices, apparently occupy a much safer position towards 1918 iron supplies than the average foundryman. Even for them the element of risk is important, however. It is worthy of passing note that there has been little, if any, buying of iron for 1918 delivery by the steelmakers up to the present time.

The moment demands from buyers of iron the most careful weighing of wants for the extended future, especially those which reach beyond the present year. A false move in a market so inflated may be overwhelming in its consequences, especially on account of the uncertainty which prevails in industrial affairs at the present time.

More deliberate action by buyers now, though higher prices may be paid later, will more fully satisfy the tests which safety and sound policy require in conservative business management.

Three-Twenty Price No Longer Nemesis

ONLY twice during the past two decades have quotations on wire products passed the $3 figure as the base price of nails. Prices went above that level at the close of 1899, and again in the early part of March of this year. When the steel company, with which the late John W. Gates was identified, advanced prices $5 a ton to $3.20 for nails, on Dec. 30, 1899, other wire makers and the iron trade in general literally sat up and took notice. Manufacturers appeared to be both dubious and skeptical; jobbers crawled into their shells and refused to replenish their stocks. It is not surprising, therefore, that prices dropped like a parachute to $2.20 a keg for nails, a decline of $20 a ton on April 21, 1900.

On March 5, last, makers of wire goods advanced quotations $4 a ton, to $3.20 a keg for nails, the historic figure adopted 17 years ago. Prices of plain wire, barb wire, galvanized barb wire and galvanized staples since March 5 have been quoted at new high price levels. The adoption of current quotations failed to create any excitement. Jobbers are buying material just as freely as if it were being offered on the basis of $1.15 for nails, the lowest price that has been recorded for this standard commodity in a period of approximately 20 years.

The $3.20 price was made in 1899 in an unsuccessful effort to stimulate activity, at a time when actual demand really did not exist; prices were boosted to that level recently, simply because trade conditions warranted the adoption of quotations considerably higher than those previously prevailing. Eighty-five formal changes in prices have been made by the more important manufacturers of wire products in the last 17 years. This is at the rate of five changes per annum. It is interesting to note that prices have been adjusted at the rate of more than nine times per year since the outbreak of the war in Europe, 31 months ago, 24 changes having been made since Aug. 1, 1914. Since that date, prices have been advanced $32 a ton. Despite the fact that previous price records have been shattered, further advances in quotations undoubtedly will be witnessed in the near future.

THE OPEN HEARTH

Two Rays of Hope

"I KNOW that the refractory I am about to put on the market is superior to the imported product," said a prominent American manufacturers, "but from a sound business viewpoint, the venture is a gamble. With tariffs, such as those provided for in the present tariff law, I would be a bankrupt in two days if the war did not shut out competition. This country has had a wonderful opportunity during the last two years, but the ears of the government seem deafened to the knock."

It is deplorable that one of the policies of the party in power is to abhor anything that savors of protection. The example quoted in the previous paragraph is one of hundreds that could be used; the intrinsic value of the statement is immaterial; the revelation of pregnant opportunities is invaluable to the nation. The same thought may be read between the lines of similar statements issued by representatives of established industries and by those who are fostering embryo industries. If the United States ever had a chance to free itself to a large extent of dependability upon foreign nations for raw and manufactured products, certainly it is at the present time. It has the material to work with, the ingenuity to solve its problems, and the capital to assure the success of all the industries for which the war has created exceptionally lucrative market. It is needless to reiterate or emphasize these opportunities. They are appreciated by the country at large; in fact, it seems, by everyone except the stand-pat free-traders in Washington. Is there no way by which these capable legislators who have jailed themselves in their own obsolete theories and tossed the key away can be made to realize the injury their policies are doing to the welfare of the nation?

We need more than tariffs to protect new industries; we need assistance unsullied by petty party policies. The manufacturers and capitalists must have confidence in the government. Given a congress willing to protect and nourish new industries after the war and, we venture to state, hundreds of new industries would spring into existence in a fortnight. The entire attitude of the present administration is characterized by Daniels' award of the 14 and 16-inch shell contract to Hadfields. Stand-patters, not against radicalism, but upon theories decrepit with old age, rule at Washington.

The darkened skies reveal but two rays of hope: The new tariff commission and the movement among manufacturers which is growing like a rolling snowball to take a more active interest in public affairs, as shown, for example, in the resolutions adopted last week at the Columbus meeting of the Ohio Manufacturers' Association. The new commission should render service of real value, but unfortunately the opportunity is passing rapidly by while the President delays the appointment of the members. The movement among the manufacturers is of great significance because it indicates a growing demand for vigorous action on the part of public officials.

Ill-Timed Strike is Treasonable

AS GERMAN plotters secretly planned for internal disturbance in this country while Berlin publicly assured the world of continued German-American friendship, so has organized labor been preparing for a nation-wide railroad strike while its leaders in Washington loudly proclaim the fullest co-operation of labor's forces with the government in case of war. Union leaders attempt to reconcile the hold-up scheduled for Saturday, March 17, with their patriotic utterances by stating that should the strike order go into effect, "definite arrangements will be made to move everything required by the United States government in order that President Wilson may not be embarrassed."

These fine words will fail to impress anyone who is acquainted with the vast industrial machinery required to keep pace with the activities of eleventh-hour preparedness which is now feverishly accentuated by looming war clouds. Every locomotive, car and mile of track of the country's transportation system is now needed as never before, and it would be national suicide to allow a reduction in railroad capacity at this time. Anything short of full-hearted co-operation on the part of united railroad labor while the nation hangs on the brink of war is not to be tolerated. A strike, such as is contemplated, would be a treasonable act almost without parallel in the history of the United States. Official Washington, now fully alive to the necessity of industrial efficiency, should have the unwavering support of the public in combating this latest menace.

Why Worry About Socialism?

Representative Meyer London, recently brought up a resolution to investigate unemployment and the advisability of establishing a national insurance fund. Representatives Mann of Illinois and Moore of Pennsylvania opposed the resolution on the grounds that it was the first real step toward socialism and that they were "sick and tired of these commissions" which encouraged "the wild opinions of crazy men who wanted to advertise themselves." Is the greatest of congressional indoor sports to be treated so lightly? What if it does encourage socialism; let the investigation go on.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products March 14, average for February, 1917, average for December, 1916, and average for March, 1916. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Mar. 14, 1917.	Aver. for Feb., 1917.	Aver. for Dec., 1916.	Aver. for Mar., 1916.
Bessemer pig iron, Pittsburgh..	$36.95	$35.95	$35.95	$21.55
Basic pig iron, Pittsburgh.....	31.95	30.95	30.95	19.20
No. 2 Fdy. pig iron, Pittsburgh	36.95	33.95	31.70	19.95
Northern No. 2, Fdy., Chicago.	35.50	31.25	29.25	18.70
Lake Superior Charcoal, Chgo..	38.75	34.50	32.00	19.75
Malleable, Chicago	36.00	30.00	25.00	19.00
Southern No. 2, Birmingham...	27.00	24.50	22.25	15.00
Southern Ohio No. 2, Ironton..	35.00	33.00	29.50	18.30
Basic, eastern Pa.....	35.00	30.50	30.50	20.50
No. 2X Virginia, furnace.....	34.00	29.00	23.75	18.00
No. 2X foundry, Philadelphia...	36.50	32.00	30.25	20.00
Ferro mang., delivered.....	275.00	265.00	162.50*	175.00*
Bessemer billets, Pbgh.....	70.00	62.50	58.75	40.60
Bess. sheet bars, Pbgh.....	70.00	62.50	58.75	41.00
Op.-h'th sh. bars, Pbgh.....	70.00	62.50	58.75	41.00
Open-hearth billets, Pbgh.....	70.00	62.50	58.75	40.60
Steel bars, Pittsburgh contract..	3.35	3.00	2.925	2.34
Steel bars, Chgo.....	3.54	3.14	3.12	2.50
Iron bars, Philadelphia.....	3.559	3.259	3.059	2.259
Iron bars, Cleveland, local del'y.	3.00	3.00	2.70	2.29
Iron bars, Chgo. mill.....	$3.00	$3.00	$2.85	$2.19
Beams, Chgo. contr.....	3.79	3.38	3.20	2.50
Beams, Pittsburgh, contr.....	3.60	3.25	3.025	2.40
Beams, Philadelphia	3.759	3.509	3.409	2.459
Tank plates, Pbgh., contr.....	4.50	3.75	3.525	2.50
Tank plates, Chicago, contract..	4.69	3.94	3.74	2.67
Tank plates, Philadelphia.....	5.659	5.009	4.409	3.409
Sheets, blk., No. 28, Pbgh.....	5.25	4.565	4.50	2.75
Sheets, blue anl., No. 10, Pbgh.	5.00	4.375	4.00	2.87
Sheets, galv., No. 28, Pbgh.....	7.00	6.50	6.25	4.82
Wire nails, Pittsburgh.....	3.20	3.00	3.00	2.38
Connellsville fur. coke, contr...	7.00	8.00	4.44	2.80
Connellsville fdy. coke, contr...	7.00	6.50	6.00	3.90
Heavy melting steel, Pbgh.....	23.00	21.875	25.00	17.95
Heavy melting steel, eastern Pa.	24.00	20.50	24.00	17.50
Heavy melting steel, Chgo.....	23.00	21.63	23.37	16.20
No. 1 wrought eastern Pa.....	30.50	27.00	28.00	23.00
No. 1 wrought, Chgo.....	26.00	24.00	25.37	16.15
Rerolling rails, Chgo.....	27.00	25.63	29.50	17.20
Car wheels, Chgo.....	20.25	18.31	21.90	14.05

*Seaboard.

(For Additional Prices See Page 652.)

Buyers Seek Pig Iron, Not Prices

Quotations Climbing to Higher Levels in Eastern, Western and Valley Districts—Heavy Inquiry for Basic—New York Melters Disturbed by Railroad Strike Threat—Chicago Prices Up

Pittsburgh, March 13.—Sales of bessemer and basic pig iron by non-merchant producers have tended to retard the upward price movement of steel making grades. During the past 60 days, fairly heavy tonnages of iron have been sold by steel works interests at Pittsburgh and Youngstown. The bulk of this tonnage, however, is understood to have been absorbed and it generally is believed that rather sharp price advances will feature the market shortly. Moderate strength already has been reflected by basic iron, which has sold at $33, valley, in lots ranging from 1,000 to 5,000 tons. The Youngstown Sheet & Tube Co., is reported to have sold about 5,000 tons of this metal for prompt delivery at that figure.

Basic pig iron is in heavy demand in the east and in the southern Ohio district. The Lukens Iron & Steel Co., Coatesville, Pa., is understood to have purchased heavy tonnages of basic pig iron from eastern furnaces for shipment in the second half of the year. The N. & G. Taylor Co., Cumberland, Md., has been negotiating for 5,000 tons of basic iron, and the Andrews Steel Co., Newport, Ky., is credited with having purchased 15,000 or 20,000 tons of this grade for shipment in the third quarter of the year.

Bessemer pig iron now is being held at $37, valley, by several of the more important sellers. At least 6,000 tons of bessemer metal have been sold at that figure. No. 2 foundry and malleable irons have advanced $1 a ton this week, and are now being held at $36, valley, as a minimum; some blast furnace interests are asking $39 for both grades. Sellers of Virginia iron who opened books about 10 days ago for delivery in the first half of 1918, have advanced prices $1 a ton to $31.75, furnace, for No. 2 plain and $32, furnace for No. 2X. Demand for shipment after Dec. 31 is not heavy.

Blast furnaces in the Pittsburgh district now are operating under nearly normal conditions. No complaint is heard about the shipment of coke and limestone. Outbound tonnages are moving much more satisfactorily than at any time this year.

Eastern Market Troubled

New York, March 13.—Threats of a general railroad strike have added another influential factor to a pig iron market which has just gone through a week of agitation and swift price changes. To the new development is traced some fresh demand for spot iron and, more clearly, some requests from buyers to the furnaces that shipments be hurried forward. Interrupted shipments, car shortages, etc., have continued to produce considerable buying of spot iron throughout the week. A new freight condition concerning the delivery of Virginia iron to this territory is the embargoing of shipments north of Hagerstown by the Norfolk & Western railroad. Only one route, the New York, Philadelphia & Norfolk now is open, and many consumers, especially in New England, are shut off completely. This embargo is expected to be lifted in a few days. Buying has been active and the week's rise in both spot and forward metal has been from $2 to $3 per ton. New England buyers paid $40.58, delivered, or $38, Pennsylvania furnace, for foundry, and about $39.25, delivered, for malleable, both for the last half. Eastern Pennsylvania sales for this year were from $35 to $37, furnace, and a good-sized lot of Virginia for the third quarter went at $36, furnace. A

(*For complete prices see page* 652)

small lot of spot Buffalo brought $38, furnace. Central Pennsylvania iron is now held at $36, furnace. There has been some selling of Pennsylvania and Virginia foundry for the first half of 1918, the former at $33 and the latter at $31 to $32, furnace. Next year's sales of the Virginia Iron, Coal & Coke Co. now are reported at about 20,000 tons. Sales of the week will include 6,000 tons of basic to a Bridgeport steelmaker; 5,000 tons of foundry to Henry R. Worthington, Inc., Newark; 2,000 tons of malleable to an eastern buyer for Michigan delivery; 1,500 tons of malleable to a Connecticut shop and some tonnage to other large consumers of this grade in the same territory. A Jersey City buyer bought against a foundry inquiry for 1,500 tons for the last half and 2,000 tons for the first half of next year. A local ship builder placed 1,000 tons for the first half of 1918. Pending inquiries include 3,300 tons for the General Electric Co., 1,000 tons for an Elizabethport shop and 1,000 tons for Bridgeport, all foundry. Export inquiries are very numerous and heavy but sales are light because of the vessel shortage. Japan has bought some lots of Alabama foundry at above $27, Birmingham. A lot of 5,000 tons of bessemer and other resale iron is being offered. Export freights on iron have been advanced $2 per ton and from the valleys now are $2.24 to New York, $2.04 to Philadelphia and $1.94 to Baltimore.

Eastern Buyers Excited

Philadelphia, March 12.—Pig iron prices have been responding in a rather excited fashion to a scale of buying, which has been the largest the past week of the recent new movement. A considerable tonnage for the first half of 1918 had been included in these sales and interest so far ahead appears to be increasing. The turns of the market have been so rapid that most business now is being done only upon its being submitted to the furnaces. Basic has lead in the week's selling. A Coatesville plate maker bought 40,000 tons for the last quarter at an average price of $33.80, delivered. About 25,000 tons of this, it is reported, was obtained from Pittsburgh at slightly under $33.50, delivered, or about $31, furnace, and the remainder in eastern Pennsylvania at $35, delivered. This buyer still is in the market. Another sale of 6,000 tons of eastern Pennsylvania basic was made to a New England consumer and a 3,000-ton lot was closed on an old quotation. The Bethlehem Steel Co. has decided not to buy on an inquiry for 10,000 to 15,000 tons for the American Iron & Steel Mfg. Co. A Cumberland plant has asked for 4,500 tons for last half and a smaller eastern Pennsylvania plate mill for about 1,000 tons. Eastern Pennsylvania foundry grades have been rising sharply. Both spot and last half sales of No. 2X have been made at $37, furnace, for that iron. One maker now quotes $37 minimum for No. 2X. A Lebanon maker, who has resumed selling, has named $36, furnace, for second quarter. There is talk of $40 having been quoted on eastern Pennsylvania iron for this year. A small lot of Buffalo foundry for the year went at $39.58, delivered, in this district. At least 2,000 to 3,000 tons of eastern Pennsylvania iron for the first six months of 1918 have been sold at $33, furnace. A Kutztown, Pa., shop was among the buyers. Central Pennsylvania brands have been put at $35, and farther west two makers are reported to be quoting $40 for this year and $35 for next. In Virginia, sales of about 10,000 tons for the first six months of 1918 at $30.50, and $31, furnace, for No. 2X, have resulted in a new schedule of $32 by the largest Virginia maker. Sales have been made on the new level. Another Virginia interest wants $36 for the first half of this year. Others have withdrawn from the market and quote only on application. A sale of 2,000 tons of Alabama No. 3 for third quarter was made to a buyer in this territory at $26.50, Birmingham, and 500 tons of No. 2 for last half went at $27. Offers at the latter figure have been declined. Small sales at a higher price are reported. A western New Jersey consumer placed 3,000 tons of low phosphorus for last half with a Lebanon maker at $60, furnace. An eastern Pennsylvania steel foundry took 1,000 tons at the same price. A local buyer asking 1,600 tons of malleable has closed. Charcoal iron has been sold here at $39.42, delivered, or $36.84, Buffalo. Hard driving is reflected in the growing number of furnaces in Pennsylvania and Virginia, which are going out for repairs. The Princess stack is among these. The Brooke furnace is planning a run on bessemer.

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Iron Sought, Not Prices

Buffalo, March 13.—The urgent demand of melters for small lots of spot iron to tide over gaps in deliveries on contract tonnages where stocks on hand have been exhausted, plus the effort of foundries to place orders for advanced deliveries has again caused a stiffening in prices. Grade differentials continue to be disregarded and producers are obtaining $38 to $40 at the furnace for foundry grades. In fact the price is not a factor where melters are able to find a desirable tonnage for prompt delivery. The demand for malleable is pronounced and the metal is unobtainable in this district at the present time. Some malleable has been sold in the past 10 days for early delivery at $38.50. Charcoal iron, according to grade and analysis is now bringing $40 to $42 for prompt needs, f. o. b. Buffalo.

The effort on the part of melters to have furnaces book their needs well into the first half of next year continues. The producers, in a good many cases, are disregarding such overtures as they are not inclined to make such advanced commitments in view of the uncertainties as to just what the market situation will be beyond the end of the current year.

The extreme scarcity of iron even in remote markets, erasing freights as an element in making sales at distant points, is reflected in a 1,000-ton order for low silicon foundry iron just booked by the Wickwire Steel Co. for delivery, via Seattle to Japan. The opposite angle of this situation is also noted in the fact that Buffalo district melters who are unable to secure tonnages in this district, have been and will probably continue for some time to buy iron from producing centers that heretofore never attempted to sell in Buffalo.

Basic Inquiries Heavy

Cleveland, March 13.—The activity of the basic pig iron market has been reflected in this district. A large number of inquiries have reached producers, but sales have been severely restricted by the limited tonnages available. A sale of a round tonnage

(*For complete prices see page* 652)

of basic for immediate delivery was made yesterday at $32, valley, and the belief is generally held by producers that this price will be exceeded. It is estimated that the basic inquiries sent into this district during the past few days total 50,000 tons, of which 20,000 tons was sought by an Ohio river steelmaker. Foundry iron continues in good demand, with producers quoting on and able to supply only a small portion of the tonnages desired. One interest which sold foundry iron a few weeks ago at $35 and then disposed of a smaller tonnage at $36, has definitely withdrawn the latter figure. A sale of 500 tons of southern No. 2 foundry for second half delivery was made here today at $28, Birmingham, but the same interest now is unwilling to quote on further business, even at $30.

Chicago Pig Market Strong

Chicago, March 13.—Decided advances have marked pig iron prices in Chicago. The situation seems to have shaped itself so that price is not much of a factor in the minds of consumers, who have more interest in placing their orders. Northern No. 2 foundry iron is quoted today at $35.50, furnace, and malleable at $36, furnace. A Milwaukee furnace is asking $36, furnace, for foundry and $37, furnace, for malleable. Southern foundry iron has been sold recently in small tonnages at $30, Birmingham, and small sales just previously were at $29, Birmingham. Lake Superior charcoal iron is quoted by one interest at $37, furnace, which makes the price delivered in Chicago $38.75. Some other makers of charcoal iron have not yet moved to that level.

Sales during March have been large compared with preceding months, and one interest is said to have booked 40,000 tons since March 1, with a good prospect of doubling this by the end of the month. Much of the tonnage has been malleable iron, which is most in demand. A sale of 3,600 tons of that grade was recently made to a Chicago machinery manufacturer, and it is said the price was $35, furnace. The same melter bought a small tonnage of southern foundry iron at $34, Chicago,

A large consumer of basic in the St. Louis district recently bought 5,000 tons from a valley furnace and the price is reported to be $31, furnace. This gives a delivery considerably lower than quotations by Chicago makers.

The Virginia Iron, Coal & Coke Co. has issued a new schedule of prices on both Watt and Virginia brands, the same figure applying to both, offering 2 to 2.50 per cent silicon at $31.75, furnace, and 3.50 to 4 per cent silicon at $33, furnace.

A Chicago dealer recently offered ceveral carloads of southern foundry iron, 4.10 to 4.50 per cent silicon with phosphorus 0.87 to 1.07 per cent at $31, Birmingham. Other makers offer similar iron with phosphorus under 1.00 per cent at $32, Birmingham.

Sales of Foundry at $27, Birmingham

Cincinnati, March 13.—Pig iron interests in this district were surprised to learn a few days ago of several sales of southern No. 2 foundry iron at $27, Birmingham basis, for spot delivery. This price has been offered for the last half by three furnaces, but spot iron has demanded a premium of several dollars a ton. The prevailing quotations today for the last half are $27 to $30, Birmingham basis, for No. 2 foundry, and from $28 to $30, for the second quarter of this year. In practically every instance, all inquiries must be submitted to furnaces before contracts can be placed.

The price of Virginia iron for the first half of 1918 has been advanced to $32, furnace, for No. 2X.

The southern Ohio situation is unchanged. The only stacks in this district that have iron to sell are the Milton stack, at Willston, O., and the stack of the Hamilton Iron and Steel Co., Hamilton, O., which will be put in blast about May 1. Southern Ohio No. 2 foundry is quoted at $35, Ironton basis, for the last half. No prices are available for either basic, bessemer or silvery irons.

Inquiry is better than last week but it is coming from a number of melters outside of this territory and it is doubtful if any of this business will be placed by local dealers. The Andrews Steel Co., Newport, Ky., is feeling the market preparatory to buying both ferro-manganese and basic iron.

St. Louis Stocks Exhausted

St. Louis, March 13.—The arrival of interest in pig iron continued in a more moderate degree last week in the St. Louis market. Some excellent inquiries from western consumers and foundries in the Illinois district were received. The car shortage and embargoes form the worst factor in the situation, and with a return to normal transportation conditions, dealers look for business equal to the most active period last year. Stocks owned by brokers and speculators, which were the chief source of supply last month, have been about exhausted. Prices remain firm.

Looking Toward $30, Furnace

Birmingham, Ala., March 13.—Some few sales of pig iron are still being noted in the Birmingham district with quotations around $27.50 per ton for standard No. 2 foundry for local delivery. There are very few furnace companies in the south willing to sell promiscuously, some holding off for a better price that is considered inevitable. High manganese iron sold last week at $30.50 per ton, though the tonnage was not great. The car shortage and the embargoes in several directions continue to trouble the manufacturers and consumers. Some export iron, waiting at Southern ports for ships, has been resold at an advance. Intimation is still heard there will be an iron famine. Inquiries are numerous. Announcement that several furnaces in the southern territory now producing foundry iron will be shifted to basic July 1, has had the effect of bringing out inquiry, strengthening the foundry market. The Woodward Iron Co. and others are said to be well supplied with basic orders and will of necessity have to increase their output of that class of iron. The cast iron pipe makers in this district are melting iron right along and are bidding on some healthy specifications, notwithstanding the recent advance in their quotations of $1 per ton. Adequate supplies of iron are said to have been provided for by the pipemakers.

(*For complete prices see page* 652)

Tubular Products Active

Pittsburgh, March 13.—Manufacturers of tubular goods have experienced no difficulty in establishing advanced prices, adopted March 5, when quotations were put up $4 and $6 a ton. Heavy demand exists for lap weld iron and steel pipe for shipment to points in the oil and gas regions. Deliveries of oil country goods are deferred from six to 12 months. Some mills are in a position to ship merchant sizes of pipe in from three to six months.

Manufacturers of boiler tubes are quoting only upon application of consumers. Prices adopted Nov. 20, 1916, are regarded as nominal; material is commanding several dollars a ton above published quotations.

Robert D. Macham, traffic manager of Rogers, Brown & Co., Cincinnati, sailed on March 12 on the steamer ROCHAMBEAU, for six months' service as an ambulance driver in France, with the American ambulance corps.

Want Alloys for 1918

Buyers Sounding Market for Both Ferro and Spiegel—Inquiry for Early Shipment is Larger

New York, March 13.—Buyers of both ferro-manganese and spiegeleisen are beginning to inquire for next year's delivery. Prices for that position are not defined. Spiegeleisen continues to attract some tonnage inquiries. A Cleveland consumer is closing for 2,200 tons for this year. A Canadian buyer asking 2,000 tons of spiegeleisen or 1,000 tons of ferro-manganese, has decided to buy the latter. The inquiries for 3,000 tons from an independent steelmaker and 10,000 tons from another buyer have become inactive. Makers are asking $75 to $80, furnace, up to the last quarter, but the lower price is being shaded where freights are against the seller. For the last quarter $60 to $65, furnace, is quoted.

Inquiry for ferro-manganese is moderately larger and about half a dozen domestic consumers are out for a total of about 3,000 tons, the largest lot is 600 to 700 tons for an eastern Pennsylvania consumer. A 2,000-ton lot has been asked for Argentine. A Canadian consumer placed about 1,000 tons. Forward prices continue from $250 to $275, delivered. English makers still decline to make any further sales for the last half at $185, seaboard, but in some cases they have not finally withdrawn this price. Spot ferro-manganese is bringing $275 to $300, delivered. Only small lots are going at the top figure. A sale of 100 tons at $285, delivered, is noted.

Manganese Ore Sales

Philadelphia, March 13.—Small sales of foreign manganese ore have been closed for open hearth purposes at well over 80 cents per unit at tidewater. Several tonnages of ore continue under negotiation, with makers of ferro-manganese and spiegeleisen, but inability to get ships blocks the development of this. It is believed 80 to 85 cents, tidewater, could be obtained if shipments could be assured. Further lots of Cuyuna manganiferous ores are being offered in the market to these consumers.

Alloys Mark Time

Pittsburgh, March 13.—Sellers of ferro-manganese and ferro-silicon have not been attempting to offer material in the open market recently, because of the uncertainty of the future. Eighty per cent ferro-manganese is being held at as high as $275, delivered, by several dealers. Fifty per cent ferro-silicon has sold at as high as $235, Pittsburgh, and lower grades of bessemer ferro-silicon are being quoted at as high as $50 for 10 per cent. Twenty per cent spiegeleisen is being held at $75 for nearby delivery.

Cast Pipe Active

But Price Advance Has Not Materialized—Cities are Buying

Chicago, March 13.—The expected advance in quotations on cast iron pipe has not materialized, but it probably will be announced shortly, as pig iron continues to seek higher levels. The date for figures on 5,000 tons at Winnipeg has been postponed to April 12. The United States Cast Iron Pipe & Foundry Co. has been awarded 1,450 tons, mostly 24-inch, at Springfield, Ill. J. B. Clow & Sons has taken 68 tons at Sidney, Ohio. The United States Cast Iron Pipe & Foundry Co. has been awarded 400 tons at Chilton, Wis. Castlewood, South Dakota, has rejected bids on 200 tons. Bids were to be opened March 13, at Great Falls, Mont., on 350 tons, and March 14 at Middletown, Ohio, on 75 tons.

New Demand for Cast Iron Pipe

New York, March 13.—New demand for cast iron pipe in eastern territory has broadened decidedly. From the municipalities alone about 20,000 tons of new inquiry have come out this week. Rochester is taking bids this week on 10,000 tons of 37-inch and on an alternate quantity of steel pipe. Hartford will receive figures March 20 on 7,000 tons of 42-inch and Canton, N. Y., March 22, on 2,250 tons of 6 to 12-inch. Ogdensburg, N. Y., is opening bids within a day or two on about 500 tons of 4 to 18-inch. On the 1,000 tons for Rochester bid upon last week, the United States Cast Iron Pipe & Foundry Co. is low. Private buying also is expanding. Eastern pipe foundries have advanced prices $1 a ton and now quote 6-inch Class B at $42.50, New York, and 4-inch at $45.50, with Class A pipe $1 higher.

The Valley Mold & Iron Co., which recently completed plans for an ingot mold plant at West Middlesex, Pa., will erect two buildings, each about 100 x 150 feet, to house equipment for making ingot molds. One of the buildings at West Middlesex will be brought to that place from Chester, Pa.; it formerly was owned by the Tidewater Steel Co. The ingot mold foundry will receive direct metal from the Ella furnace, formerly controlled by Pickands, Mather & Co., Cleveland, and now owned by E. W. Mudge & Co., Pittsburgh.

(*For complete prices see page* 652)

Wire Sells at New Levels

Pittsburgh, March 13.—Wiremakers are selling material at prices formally adopted March 5. On that date, as previously pointed out in these columns, manufacturers put up prices $4 a ton to $3.20 a keg for nails. Jobbers are covering only actual requirements, but are not complaining about prevailing prices, which are the highest recorded since Dec. 30, 1899. Belligerent European nations continue to negotiate for heavy tonnages of barbed wire and nails. All kinds of wire products are wanted for shipment to South American and far eastern countries.

Nuts, Bolts and Rivets

Pittsburgh, March 13.—Manufacturers of structural and boiler rivets last week advanced prices $10 a ton, following an advance of $7 a ton in the price of steel bars. Structural rivets now are quoted at 4.75c and boiler rivets at 4.85c. Prices of nuts and bolts likely will be advanced proportionately at an early date. Heavy tonnages of rivets are being delivered to ship yards on the eastern and western seaboards.

Electric Furnaces Sold

A 1-ton Rennerfelt electric furnace, rated at 300 kilowatts, has been sold to the Oklahoma Iron Works, Tulsa, Okla., and will be installed in the new steel foundry of that company. Two other furnaces have been sold for shipment to Europe. A larger Rennerfelt unit recently installed at the plant of the Parsons Co., Newton, Ia., is now in operation.

The Standard Steel Car Co., Pittsburgh, has resumed the manufacture of steel shells for the allies at its plant at New Castle, Pa.

Reports that the Valley Mold & Iron Co., Sharpsville, Pa., was to be sold at an early date are denied by George H. Boyd, president of the company.

Bars Climb to High Levels

Eastern Independents Go the Corporation One Better, Making Sales at 3.75c, Pittsburgh—Iron Bars Higher

Philadelphia, March 12.—One prominent independent maker of steel bars has fixed his price at 3.75c, Pittsburgh, an advance of $5 to $10 a ton, and is quoting that figure on some miscellaneous second quarter contracting that is being done. This mill will offer no bars for export, as it is having difficulty to meet its domestic obligations. Another independent is naming 3.50c, Pittsburgh, as his minimum on steel bars since the Steel Corporation's advance to 3.35c, Pittsburgh. This producer previously had sold first and second half bars at 3.25c and 3.50c, Pittsburgh. New orders in bars continue of a scattered character. Some important consumers in this territory who have specified their contracts in full practically are endeavoring to place some new tonnage.

Steel Bars Now Held at 3.35c

Pittsburgh, March 13.—Under date of March 8, the Carnegie Steel Co. advanced its price of steel bars $7 a ton to 3.35c for shipment at its convenience. The company cannot promise deliveries until the latter part of the year. Independent bar makers are quoting 3.35c and above. Bar iron manufacturers early last week advanced prices $5 a ton to 3.50c for future shipment; the 3.25c price, however, has not disappeared.

Steel Bars are Advanced

Chicago, March 13.—An advance of $7 per ton on soft steel bars was announced late last week, bringing the quotation to 3.54c, Chicago mill. This figure has not stopped efforts of consumers to place further contracts with steel makers and demand remains unabated. Agricultural implement makers continue to place business in small lots for 1918 delivery. Apparently nothing in this line is available for the last half of this year. While the purchases are small, the aggregate is a fairly large tonnage. The question of price is not discussed; buyers are anxious only to have their business booked.

Hard steel bars, rerolled from rails, which have held steadily at 3c, Chicago mill, for some time, were advanced March 12 to 3.25c, Chicago mill. This advance has been foreseen for some time with the strong demand for this product and advancing cost of rails. The fact that soft steel bars now are quoted at 3.54c for next year's delivery also strengthens the position of hard bars, on which reasonably early delivery can be made by most makers.

Some Sales at New Prices

Cleveland, March 13.—The advances in the prices of bars, shapes and plates, announced by the Carnegie Steel Co. last week, have brought out some additional business from buyers in this district. None of the steel companies has much tonnage for sale and sales representatives are devoting their time largely to distributing the tonnage equitably among their customers. Deliveries already are so far behind that the mills are reluctant to take on additional business for rolling at an indefinite future date. A number of agricultural implement manufacturers have closed during the past few weeks. It is understood that this business went generally at 3c. The new schedule of 3.35c on steel bars is being enforced, while some of the independents are quoting higher.

Eastern Advance

Philadelphia, March 12.—A second advance of $5 a ton during the past two weeks has been announced by eastern makers of bar iron. This new price is 3.50c, Pittsburgh, or 3.659c, Philadelphia, and was effective March 9. Eastern bar iron now is held $3 a ton above the minimum prices for steel bars.

Chicago Iron Bars Strong

Chicago, March 13.—Although demand for bar iron continues excellent, and mills are not anxious to contract much further tonnage, the quotation remains steady at 3c, Chicago mill. Under the present circumstances, an increase is believed to be imminent and may be announced at any time. Advances in quotations by eastern makers have strengthened the market in the west and some small tonnages sold by Chicago makers for delivery in eastern territory have been booked at 3.10c, Chicago mill.

Chain Held at 6.50c

Pittsburgh, March 13.—Manufacturers of steel chain now are quoting 6.50c for ⅜-inch proof coil. Ship builders are buying heavy tonnages and are paying premium prices frequently for early delivery.

Shafting Held at 10 Off

Pittsburgh, March 13.—Manufacturers of cold rolled steel shafting, with one or two exceptions, now are quoting 10 per cent off the list for future shipment. It is not believed heavy tonnages are available at less than that price. The United States government has been an active buyer of shafting for the manufacture of fuses.

Hoops and Bands Higher

Pittsburgh, March 13.—While the Carnegie Steel Co. has made no formal change in its prices of hoops and bands, yet consumers say material is not available at less than 3.35c for bands and 4.10c for hoops. Some mills, in a position to meet specifications for shipment before July 1, are selling bands at 4c and hoops at 4.25c and above. Demand is described as heavy.

(*For complete prices see page* 652)

Sell Camden Iron Works

Trenton, N. J., March 13.—Judge Haight of the United States District Court has decided to permit the public sale of the Camden Iron Works at Camden, N. J. The sale will be held during the last week in April and will include the real and personal property of the concern. The purchaser must assume the $1,500,000 worth of orders contracted for by the receiver, Heulings Lippincott, of Camden. It is said the receiver has enough funds on hand to enable payment of about 50 per cent dividend on the total of $1,000,000 of liabilities. Lawyers representing the creditors objected to the sale. Judge Haight said he would give the receiver an opportunity to see if a reasonable price could be obtained. He said he would not confirm a sale if it developed that manipulation among creditors and a purchaser resulted in an inadequate selling price.

Tin Plate Market Quiet

Pittsburgh, March 13. — The market for tin plate is almost at a standstill. This is because manufacturers have no additional tonnages to offer for delivery before July 1. Books for shipment after that date likely will not be opened until the middle of the second quarter of the year. Heavy demand exists for shipment abroad, but manufacturers in this district are unable to entertain negotiations for export, because of inability to meet specifications for delivery.

Robert L. Arms, for several years connected with the sales department of Manning, Maxwell & Moore, has associated himself with Sherritt & Stoer Co., Inc., 603-604 Finance building, Philadelphia, Pa., as assistant to the general manager.

Sheet Makers Hold Whip

Buyers Glad to Get Bookings on Manufacturers' Terms—Valley Production Increased—Prices Higher at Pittsburgh

Youngstown, O., March 13.—With the cost of producing sheets increased by 17 to 18 per cent under the new wage scale, another rise in the prices of all grades may be expected shortly. Meanwhile, while the maxima are not appreciably higher than they have been for several weeks, the minima are being lifted; the range has contracted and present quotations are hard and fast.

For bessemer black sheets, no price of less than 5.25c base can be found in a day's shopping in the Mahoning valley; up to 5.85c and above for certain specifications is being paid. Bessemer blue annealed is quoted at not less than 5c; one maker is asking 5.25c. Galvanized sheets appear to be set solid at 7c, only one interest quoting on coated material just now.

Except in the case of one mill, shipping conditions, both as to shipments of fuel and raw materials into the mills and shipments of finished steel to consumers, have improved; barring unusually untoward conditions, steadily continued improvement is looked for generally.

One mill—the largest producer of black sheets—asserts that its mills are now running full time. Another large mill reports that it is operating at about 90 per cent of its capacity. None appears to be running at less than 80 per cent.

Shipments of spelter and sulphuric acid into the Mahoning valley have improved considerably, so that about 50 per cent of the pots are now in operation; 25 per cent and less has been the rule.

Inquiries for all grades of sheets continue to pour into the valley both from foreign and from domestic sources. There appears to be a slightly stronger demand for the heavier grades, and more inquiries for lighter sheets than for medium gage material.

But despite that production has improved, it is increasingly difficult to get sheets, unless the prospective buyer is fortunate enough to be after certain sizes, the production of which is attractive to mills in this territory. Probably not more than 25 per cent of the business coming into the valley is accepted. Large tonnages are turned away every day. In some cases the inquirer leaves the price open, being willing to pay whatever the maker deems fair, and knowing that he probably would have to pay the manufacturer's price anyway, if the manufacturer consented to take the business.

It appears to be an abiding conviction with sheet makers in the valley that before many moons have rolled around, the trade will be talking of 7c bessemer black sheets as a matter of course and of fact. It is almost impossible to get open-hearth sheets at any price, and when a little is sold, the normal differentials do not apply.

Blue Annealed in Demand

Philadelphia, March 12.—A price of 4.75c, Pittsburgh, or 4.909c, Philadelphia, for No. 10 gage blue annealed is being discontinued by eastern sheetmakers. Some old quotations at this figure still are outstanding, but no new ones are being made. A minimum price of 5c, Pittsburgh, is in sight. New business offering is heavy and makers are obliged to decline considerable tonnage in order to take care of their regular customers.

Sheet Prices Hardening

Pittsburgh, March 13. — Despite the fact that most sheet mills have withdrawn from the market for delivery before July 1, enough tonnage has been sold this week to indicate that prices are hardening all along the line. Black sheets have commanded as high as 5.85c and no material appears to be available at less than 5c for No. 28 gage. Coated stock has advanced $3 a ton to a minimum of 6.75c, with some sales reported at as high as 7.50c, base. Blue annealed sheets are selling at a range from 4.75c to 5.25c, or $5 a ton above previously prevailing quotations.

Books for shipment in the third quarter of the year, *The Iron Trade Review* is informed, will be opened about April 1. Consumers in all sections of the country have been attempting to cover third quarter needs for several weeks, and heavy tonnages have been reserved, although no formal prices have been named. Manufacturers are shipping some material to the east and west by express.

Not more than 35 to 40 per cent of the galvanizing pots in sheet mills are in use. Several prominent mills have not been coating material for several months. Shipments of spelter have been deferred considerably by congested traffic conditions.

The power plant of the Westinghouse Machine Co., East Pittsburgh, Pa., was destroyed by fire, March 11. The building was 70 x 200 feet. According to E. M. Herr, president of the company, "the fire was caused by crossed wires". Several weeks ago, the machine shops of the Union Switch & Signal Co., a Westinghouse subsidiary, were destroyed by fire, the origin of which is not known.

(*For complete prices see page* 652)

Coal Situation on Lakes

Manufacturers and mine operators in the Lake Superior district are watching the coal situation closely. Interest has been aroused lately by unconfirmed reports that some coal companies have sold such immense tonnages for export this year that the amount of coal furnished for transportation on the Great Lakes may fall off sharply. While considerable coal tonnage has not been contracted for, the lake vessel interests expect to carry a normal tonnage of coal this season and expect the market to crystallize with the coming of warmer weather. The great demand for iron ore may result in a large number of boats returning light to upper lake ports, a condition that prevailed last year. The coal needs of the Lake Superior district are heavier this year, owing to the comparatively lighter movement last year when 28,792,800 net tons were moved against 33,362,379 net tons in the record year of 1913. It is estimated that at the opening of navigation this year, Duluth and Superior will have a supply of 300,000 to 500,000 tons of coal against about 2,500,000 tons at the same time last year.

Strip Steel is Higher

Pittsburgh, March 13.—Cold rolled strip steel manufacturers now are asking 8c, base, for shipment at their convenience. Not enough tonnage has been sold this week, however, to indicate whether the 7c price has disappeared. Although mills have not opened books for the third quarter, most of them have enough tonnage on hand to maintaing present operating rates well into August.

Death of F. E. Hazard

New York, Feb. 28.—Frederick Rowland Hazard, president of the Solvay Process Co., Syracuse, N. Y., and president of the Syracuse Trust Co. and a director of many other concerns, died at Syracuse February 27. He was born at Peacedale, R. I., and graduated from Brown University in 1881. He was a presidential elector last year.

The Pennsylvania Engineering Works has put into operation a new foundry at its plant at New Castle, Pa.

Car Buying Picks Up

Inquiries and Sales are Heavier—Locomotive Builders Offered Plenty of Business—More Rail Orders

New York, March 13.—Car buying shows signs of picking up. Inquiries and sales are heavier. The Union Tank Line has placed 1,250 tank cars with the American Car & Foundry Co., the Great Northern 250 gondolas with the Western Steel Car & Foundry Co., the Western Maryland 300 hoppers with the Pullman Co., the Reading 40 passenger types with the Harlan & Hollingsworth Corporation. The Cambria Steel Co. will build 1,000 coal cars for the Marianna Coal Co.

New inquiries include 1,000 hoppers and 1,000 gondolas for the Reading, 1,000 box and 1,000 flat for the Seaboard Air Line, 200 tanks for the Burlington, 160 assorted types for the Birmingham Southern, 310 subway bodies for the Interborough Rapid Transit Co., 200 to 400 car bodies for the Boston Elevated railroad, 50 hoppers each for the American Smelting & Refining Co. and for the Copper Range road, and 300 cane cars for Holland.

Locomotive business is heavy. The Reading has placed 25 with the Baldwin Locomotive Works and will build 20 in its own shops. The Atlantic Coast Line has ordered 20 from the same builder. The Grand Trunk has placed 30 with the Canadian Locomotive Works and five with the American Locomotive Co. The Canadian works has received 22 for other roads. The Chicago & North-Western has inquired for 120 locomotives.

In rails, the Pere Marquette has placed 10,000 tons with the Lackawanna Steel Co., for 1918 delivery, and the Michigan Central 7,000 tons additional with the Illinois Steel Co. for the same shipment. The Pennsylvania railroad officially announces its 68,333 tons of rails placed for 1918 delivery as fully reported last week will cost $40.80 per ton. The 80 cents extra over the base price is due to the nick and break test in its specifications.

Spikes Advanced $2

Pittsburgh, March 13.—Manufacturers of railroad spikes have advanced quotations $2 a ton to 3.50c for standard sizes. Fairly heavy tonnages have been sold at that figure, although the 3.40c price has not disappeared entirely. Manufacturers of light steel rails, who advanced quotations $5 a ton a week ago, have experienced no difficulty in selling material at higher prices. Heavy demand exists for shipment to points in the coal mining regions.

Track Fastenings Advance

Chicago, March 13.—An increase of $2 per ton on spikes and bolts, and $5 per ton on tie plates has been made, bringing spikes to 3.60c, bolts to 4.60c, and tie plates to $60, Chicago. Considerable demand for track fastenings has been apparent recently and tie plates have been especially active. Some important business in this product has been placed in lots of from 1,000 to 20,000 tons.

Car Buying is Light

Chicago, March 13.—The Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., has taken 150 flat cars and 100 fruit cars for the Florida & East Coast railroad, and 250 box cars for the Norfolk & Southern.

Plates Boosted $15

Demand From Ship Builders Continues Heavy

Pittsburgh, March 13.—The Carnegie Steel Co., on March 8, advanced its minimum price of steel plates $15 a ton and now is quoting this product at 4.50c for delivery at its convenience. This is the sharpest advance in price made by the Carnegie company in many years. Independent manufacturers are quoting steel plates at 4.50c and above. Consumers of tank plates have closed for fairly heavy tonnages at 5.25c for prompt delivery. During the last 12 months steel plates have advanced $43 a ton for future shipment. During the depression of 1914 and 1915, material was offered at as low as 1.05c a pound. Demand for ship plates has been exceedingly heavy during the past 12 months; this material has been sold freely at 6c and above. Shipments are described as more satisfactory.

More Ships Let in East

New York, March 13.—Further contracts for vessels have been placed with American yards by the Cunard line. The Bethlehem Steel Co. ship companies have closed for some additional boats and the Newport News Ship Building & Dry Dock Co. also has taken an order. The total number of the boats placed now is said to be in excess of 20. The Texas Co. has ordered three more vessels to be built at its own yard at Bath, Me. The New York Ship Building Co. will build for its own account two 5,500-ton and two 4,000-ton steamers.

Market Beyond Control

Philadelphia, March 12.—No limits yet may be described either for the prices on plates asked by eastern makers or on the tonnage of new demand that comes on persistently week in and week out. One of the most prominent of the eastern Pennsylvania group of producers has added another $10 raise to his schedule, making a total advance of $20 per ton in about ten days. The prices of this maker now are 6c, Pittsburgh, or 6.159c, Philadelphia, on tank plates; 7.50c, Pittsburgh, or 7.659c, Philadelphia, on ship plates, and 9c, Pittsburgh, or 9.159c, Philadelphia, on Lloyds boiler plates. Marine boiler plates have been left unchanged at 15.40c, Pittsburgh, or 15.559c, Philadelphia. This mill reports the placing with it during the past few days of large orders for tank plates at 6.159c, base, Philadelphia, for shipment at its convenience. Other eastern mills are continuing to quote tank plates at 5.50c, Pittsburgh, and ship plates at 7c, Pittsburgh, and are getting all the tonnage they want. Large domestic buyers, including some of the ship builders, are in the market to place contracts as far in the future as the mills will allow. It is estimated that about 100,000 tons of business was offered during the week at current prices by these buyers. The Bethlehem Steel Co., which is credited with requiring about 65,000 tons of plates and shapes, to cover recent Cunard boat contracts, has been in the market for 30,000 to 35,000 tons of this. This builder is said to have closed for at least two more of these boats. An Atlantic coast yard wants 20,000 tons of plates, a Seattle builder 5,800 tons of plates and shapes, a Vancouver interest 20,000 tons of plates, and another Canadian ship builder 5,000 tons of plates for one year delivery. Japan is seeking further tonnage insistently and Norwegian buyers are offering some attractive specifications. An inquiry for light plates for hand grenades for France has reappeared and 6,000 tons now are wanted. The American Car & Foundry Co. has placed 7,000 tons with eastern makers for new tank cars. Another recent order was 1,500 tons of plates for Iroquois furnace construction at Chicago.

Ship Builders Watch Market

Cleveland, March 13.—Ship builders on the Great Lakes are watching the

(*For complete prices see page* 652)

plate market closely. While some delays may develop in delivering plates on boats scheduled for launching at Great Lakes yards this summer, it is believed that lake builders will be able to turn out close to schedule time all the vessels under contract for 1917 delivery. A large amount of tonnage for salt water service has been placed before lake builders recently. Their decision on these offers rests largely upon their ability to insure plate deliveries and upon the wishes of Washington officials in their plans for hurrying up government work.

Plate Advance is Record

Chicago, March 13.—An increase of $15 per ton on steel plates announced last week is believed to establish a record for a single advance. This brings the present quotation to 4.69c, Chicago mill, for delivery in 1918. Mills which can offer better delivery can obtain almost any price and offers of 6c have been made frequently, while some business is said to have been placed at 7c and 7.50c. The Japanese government was inquiring last week for a comfortable tonnage and was said to have placed this at 10c, but investigation indicates that this figure covers only marine boiler plates, which take a considerable extra over ship plates.

Store Prices Are Up

Chicago, March 13.—Warehouses advanced bars, structural shapes and blue annealed sheets $5 per ton and steel plates $15 per ton, effective March 9. The next day an increase of $5 per ton on black sheets was announced. This increase followed immediately the announcement of new levels on mill products which was made the middle of last week. Demand for material from store continues strong and much difficulty is met in attempting to fill the needs of consumers.

Store Prices Up in East

New York, March 13.—Advances in warehouse prices have been made in this district to make them conform with the new mill schedule announced by the Steel Corporation. Plates have been raised $8 to 5.50c, delivered; shapes, $8 to 4.50c, delivered, and steel bars $7 to 4.35c, delivered. Iron bars are held from 4c to 4.25c, delivered.

Warehouse Prices Advanced

Pittsburgh, March 13.—In consonance with advances in mill prices announced last Thursday by manufacturers of plates, shapes and bars, warehouse managers advanced quotations to 5.50c for plates; 4.50c for shapes, and 4.25c for bars. No extra now is being charged by warehouses for bars over 2 inches in diameter. The price of plates was advanced $15; that of shapes, $10, and that of bars, $7 a ton by warehouse interests. Demand for warehouse material is heavy. Deferred mill deliveries, however, make it increasingly difficult for warehouses to fill large orders for single sizes.

Prices Higher in Detroit

Detroit, March 13.—Demand for warehouse products is exceedingly strong in Detroit. Prices have been advanced as in other centers. Current quotations are as follows: Steel and iron bars, 4c per pound; structural shapes, 4.25c; plates, 5.50c; No. 28 black sheets, 5.75c; No. 10 blue sheets, 5.50c; No. 28 galvanized, 7.50c; hoops, 4.50c.

Warehouse Sheets Up.

Cleveland, March 14.—Blue annealed sheets, No. 10 gage, from warehouse, have been advanced $5 a ton by some dealers. Black sheets, No. 28 gage, warehouse, have also been advanced $5. Blue annealed sheets, No. 10 gage, are quoted at 5.25c and black sheets, No. 28 gage, at 5.75c.

Prices Are Up

Cincinnati, March 2.—Warehouse prices have been advanced on iron and steel bars, structurals and blue annealed sheets No. 10 gage. Steel bars are now quoted from 4.15c to 4.45c, shapes at 4.40c and plates at 5.50c, Cincinnati. Blue annealed No. 10 gage stand at 5.50c. The market is active, demand being especially good for building materials.

Export Billet Inquiries

Flood Eastern Market—One Lot in New York Calls for 200,000 Tons—Crop Ends Lower

Philadelphia, March 12.—Some fair-sized lots of low phosphorus muck bar are being sold to special steelmakers by eastern Pennsylvania makers at from $110 to $125, mill. Forging billets are being quoted at $90, mill, and upward, but eastern makers have few to offer in the open market. Rerolling billets nominally are at $65, mill, with practically nothing to be had from the makers. Some large foreign inquiries for 4 x 4-inch billets have been received by mills in this territory. One matter which came up at New York called for 200,000 tons. Shell steel crops and discards are not so easy to sell and some makers have been willing to accept lower prices. The market is thought to be around $40, mill. Some rejected shell cores have been sold at $29.50, delivered to eastern buyers.

No Sheet Bars for Sale

Youngstown, O., March 13.—No sheet bars are for sale in this territory. The only interest in the market for some months, having sold out for the second quarter, will not for some time do business for the third quarter and is offering no quotations. This interest is making no forecasts as to what its third quarter price will be, but one observer here thinks that $75 would represent a conservative guess. It may be fairly late in the spring before books are opened, however, and many things may happen to the semi-finished steel business before then, and doubtless will.

With better shipment of raw materials and fuel into steel works, production has improved; altogether plant operations in this district are probably about 90 per cent of capacity. Outgoing shipments to consumers of semi-finished steel are not quite so good, but the outlook is better.

Semi-Finished Higher

Pittsburgh, March 13.—Manufacturers of semi-finished steel products have disposed of virtually their entire output for the second quarter of the year, at about $65, mill, for billets and sheet bars. Some sellers are asking $70, mill, and some tonnage is reported to have been sold at $72.50. Specifications against contracts are described as exceedingly heavy. Shipments have improved appreciably since about Feb. 20. Wire rods are being held at $85 a ton and forging billets are commanding as high as $100 a ton, Pittsburgh. Muck bar nominally is quoted at $50, Pittsburgh.

Properties of the Pittsburgh & Westmoreland Coal Co. in Washington county, Pa., have been transferred to the Union Coal & Coke Co., Pittsburgh. About 26,000 acres of coal land are involved.

The Midvale Steel & Ordnance Co., Philadelphia, has purchased 116 acres of coal land from the Henry Rigler estate in West Bethlehem township, Washington county, Pa.

(*For complete prices see page* 652)

Fabricators Take Business

In Large Chunks in Both Eastern and Western Fields— More Philadelphia Subway Bids Called For

Philadelphia, March 12.—Three more sections of the new Philadelphia subway system requiring 13,000 tons have been offered for bids April 3. Necessary legislative action at Harrisburg is about to be taken to permit the placing with the fabricating shops of 8,000 tons of similar work recently bid upon, which is expected to be divided between the American Bridge Co. and the McClintic-Marshall Co. Urgent government work still looms up actively. An electrical repair shop, 3,500 to 4,000 tons for the League Island navy yard is out for bids and considerable aeroplane and dirigible baloon hangar construction is coming up. Smaller work on the market is fair. Eastern makers of standard sections in spite of all their efforts to hold down tonnage still face a growing order book. This is partially due to the reduced output recently which has been 10 to 15 per cent below normal. One mill in this class has advanced its minimum price to 3.75c, Pittsburgh, or 3.909c, Philadelphia, and has closed small sales at 4c, Pittsburgh. Another maker is considering advancing above 4c, Pittsburgh. A leading eastern maker of special section however still could take on considerable tonnage and is quoting 3.50c, Pittsburgh, compared with 3.35c recently and with 3.60c the new Steel Corporation price.

Government Requirements Large.

New York, March 13.—A heavy tonnage of structural steel is represented by the orders recently placed and now in prospect for government work of a military character. The original tonnage of some of the contracts recently placed has been extended under the permitting clause in the proposals. This has been principally in connection with the work at Philadelphia and Norfolk navy yards, and some of these increases previously had been noted. It is estimated that the government structural work already closed or about to be bid upon aggregates probably 40,000 to 50,000 tons. About 10,000 tons for crane runways and additional shapes both at Philadelphia and Norfolk now are being bid upon. Another interesting matter now pending is the taking of bids of from one to 20 aeroplane hangars for different locations, the maximum of which will entail from 8,000 to 9,000 tons. New miscellaneous tonnage coming into the market makes a very fair showing. Bridge inquiries from the railroads are more numerous. Those offered this week totaled from 2,000 to 3,000 tons. Plain material prices are quoted from 3.50c to 4c, Pittsburgh, or 3.669c to 4.169c, New York. There is only one seller at the minimum figure.

Structural Shapes Up $7

Pittsburgh, March 13.—Last Thursday the Carnegie Steel Co. advanced its price of structural shapes from 3.25c to 3.60c, or $7 a ton for delivery at its convenience. The price of this material has advanced $27 a ton since March 1, 1916. It is likely that quotations will be advanced further at an early date. Specifications against contracts are described as heavy and some new demand exists. Fabricating shops are being operated at maximum capacity and many interesting inquiries for structural material are under consideration. Rolling mills, no longer hampered by the shortage of fuel, are meeting specifications for delivery more satisfactorily than they were a fortnight ago, when congested traffic conditions compelled many mills to pile heavy tonnages of finished products in their yards.

Not Anxious to Sell

Buffalo, March 13.—Further advances have taken place in structural shapes. The price has gone to 3.60c according to quotations being made by the leading interest and most of the independent producers. Some of the leading mills report that deliveries on structural booked now cannot be made until the second half of 1918; this is a record for extended deliveries.

Mills are less disposed to accept business at the new and higher level of prices than they were up to 10 days or so ago. Curtailed operations, the holding over of a greater tonnage for extended deliveries than had been anticipated, plus the prevailing belief that in the event of the United States entering the European war the producers will have little or nothing to sell in the open market, are among the reasons given for mills holding to the new prices, and the few sales that have been made on the basis of the stiffened prices being asked.

Structural Demand Better

Chicago, March 13.—The activity of mining concerns in the west gave the structural market support during the last few days. The United Verde Extension Mining Co. has placed 3,900 tons for a smelting plant at Jerome, Ariz. The Garfield Smelting Co. has placed 1,200 tons for a roaster building at Garfield, Utah. Both these tonnages will be fabricated by the Kansas City Structural Steel Co. The Calumet & Hecla has placed 110 tons with the American Bridge Co. An unusual number of projects were let during the past week, most of them for railroad and industrial purposes.

A sharp advance was announced last week of $7 per ton in the cost of shapes, bringing the quotation to 3.79c, Chicago mill.

Settlement of labor difficulties in connection with the Union Station at Chicago probably will bring a large tonnage of structural steel into the market shortly. Contracts on part of the freight warehouses already have been let, but there remains a considerable quantity which has not yet been put on the fabricators' books.

CONTRACTS PLACED.

Government machine shop, Mare Island navy yards, 500 tons, McClintic-Marshall company.

Office building, 110 William street, New York City, 800 tons, to the Eastern Steel Co.

Bridge work for the Baltimore & Ohio railroad, 700 tons, to the Fort Pitt Bridge Works.

Hotel at Twenty-eighth street, New York City, 700 tons, to the Hinkel Iron Works.

Building for the Niles-Bement-Pond Co., Plainfield, N. J., 250 tons, to L. F. Shoemaker & Co.

Building for the General Electric Co., Harrison, N. J., 200 tons, to the American Bridge Co.

Work for the Kansas City Smelting & Refining Co., 600 tons, to the El Paso Bridge Company.

Bridge work for the Norfolk & Western railroad, 400 tons, to an independent shop.

United Verde Extension Mining Co., smelting plant at Jerome, Ariz., 3,900 tons, to Kansas City Structural Steel Co.

Garfield Smelting Co., roaster building at

Mill Rolls Shapes to Fit Storage Space

Delays in shipping finished products, due to traffic congestion, have given steel plant executives a great deal of trouble during the past few weeks. The seriousness of such a situation is graphically shown by the experience of a big steel company when conditions were at their worst a short time ago. The shape mill was tightly scheduled for days ahead but on the day that angles were to be rolled, no storage room could be found and cars for direct shipment were simply nonexistent. A careful scrutiny of all available space showed that more stock could be piled only in one spot—the space between the railroad tracks and the shipping platform. The only stock adapted to these cramped quarters were Z-bars, so the schedule was tossed aside, and mills rolled Z-bars on a foreign order that ordinarily would not have been filled for a long time.

(For complete prices see page 652)

Garfield, Utah, 1,200 tons, to Kansas City Structural Steel Co.

Chicago & Northwestern railroad, additional material for machine shop at Chicago, 577 tons, to A. Bolter's Sons Co.

Minneapolis, St. Paul & Sault Ste. Marie Railway Co., one deck girder span and five riveted truss spans, Chippewa Falls, Wis., 510 tons.

The A. T. Lewis & Son Dry Goods Co., store building at Denver, Colo., 392 tons, reinforced concrete.

Foster Machine Co., machine shop and assembly building at Elkhart, Ind., 215 tons, to Elkhart Bridge Co.

First National Bank building, San Francisco, columns, 165 tons, to California Steel Company.

CONTRACTS PENDING.

One to twenty aeroplane hangars for United States government for various locations to be determined later, 400 to 450 tons each, bids being taken.

Electrical repair shop, League Island Navy yard, Philadelphia, 3,500 to 4,000 tons, bids asked.

Subway contracts Nos. 103, 104 and 105, for city of Philadelphia, 13,000 tons, bids to be taken April 3.

Free library, Philadelphia, 2,000 tons, bids being taken.

Bridge work for the Delaware, Lackawanna & Western railroad, 1,100 tons, bids being taken.

Shop buildings for the Alan Wood Iron & Steel Co., Ivy Rock, Pa., 800 tons, bids being taken.

Bridge work for the Pennsylvania railroad, 500 tons, bids being taken.

Bridge work for the Chesapeake & Ohio railroad, 300 tons, bids being taken.

Bridge work for the New Haven, 300 tons, bids being taken.

Scrap Generally Higher

Increased Consumption and Higher Pig Iron Quotations Create Buoyant Market—Railroad Offerings Heavy

Chicago, March 13.—Continued confidence on the part of dealers in the future of iron and steel scrap has resulted in a distinct advance on most grades. The increase ranges from 25 cents to more than $1 per ton. Consumers are not buying.

Railroads are offering scrap in somewhat larger tonnages, although the total from this source is still below normal. Lists now current aggregate about 11,000 tons and include the following: Chicago, Milwaukee & St. Paul railroad, 5,000 tons; Union Pacific railroad, 2,300 tons; Wabash railroad, 1,700 tons; Chicago & Eastern Illinois railroad, 1,240 tons; Chicago, St. Paul, Minneapolis & Omaha railroad, 765 tons, and Chicago-Great Western railroad, 500 tons.

Prices Rise in Philadelphia.

Philadelphia, March 12.—Prices on iron and steel scrap have been advancing rapidly as the demand is active and conditions are strong. The tonnage of sales is limited by the unwillingness of the middlemen to commit themselves far ahead and sizeable transactions are comparatively few and far between. No. 1 railroad wrought now is selling above $30, delivered. Some of the leading eastern Pennsylvania consumers of heavy melting steel are offering $23.50, delivered, but one sale of 5,000 tons is reported around $24, delivered. Rerolling rails were sold this week at $31, delivered.

Old Materials Higher.

Pittsburgh, March 13.—Prices of iron and steel scrap continue to harden at Pittsburgh. Material disposed of by railroads early this month commanded much higher prices than the tonnage offered early in February. Dealers are asking as high as $24 a ton for heavy melting steel. Rerolling rails are being held at $30 a ton and low phosphorus steel scrap is quoted at $35 by some of the more important sellers.

Want Scrap in Buffalo

Buffalo, March 13.—There is an increased demand for old material. Heavy melting steel now brings $24 to $24.50; low phosphorus steel scrap, old car wheels and cast scrap are stronger. It is pointed out that the stiffened prices and the scarcity of pig iron have stimulated the demand for several of the scrap lines. The market has become much stronger and early advances in prices are anticipated.

No. 1 Machine Cast Advances

Cleveland, March 13.—Fair to heavy trading in old iron and steel in other cities is as yet having no effect on the Cleveland situation. Prices are firm and practically unchanged except for No. 1 machine cast which, because of a flurried demand a few days ago, rose to $20 to $21.50. Some of the previous quotations had been as low as $18.25. This item may see a further advance. Heavy melting steel is quoted at $22.75 to $23.50. The transportation situation has improved a very little; such congestion as still obtains, in the absence of any real trading, is not felt seriously.

Melting Steel is $23

Cincinnati, March 13.—The iron and steel scrap market has strengthened during the past few days. Users of heavy melting scrap, who have been unable to secure sufficient shipments of this grade in the past few weeks, are offering better prices for delivery within definite periods. Quotations for this material range from $22 to $23 a gross ton, Cincinnati. The price last week was $19.50 to $21 a gross ton. Steel scrap is stronger than cast scrap, because of the demand for the former from outside users. Bundled sheet scrap is from $14.25 to $14.75 a gross ton, machine shop turnings from $9.25 to $9.75 a gross ton, and No. 1 machine cast from $16.25 to $16.75 a net ton, all Cincinnati basis.

Firmer in St. Louis

St. Louis, March 13. — Changes in scrap steel and iron prices in the St. Louis market last week were all on the upward scale. There was a decidedly firmer tone and predictions were for still further advances before the end of this month. The market is apparently on a more solid basis than has been the case since the first of the year, and the strength extends to nearly all grades.

Prices Change in South

Birmingham, Ala., March 13.—A few changes are noted in scrap iron and steel quotations and there is a little greater activity. Car wheels are bringing $16 to $16.50 and even $17, while tram car wheels are quoted at $14.50 and $15. Old steel axles are held at $35 to $36 per ton and old steel rails have assumed a strong position around $18 and $18.50 per ton. There appears to be a plentiful stock, but consumers continue in need of certain products, heavy melting steel in particular, which is quoted around $16.50 and $17. There is reiteration of the statement on the part of the dealers that conditions warrant advances, the pig iron market as well as the activity in steel being pointed to for a basis. However, it is hard to bring about a reconciliation between consumers and dealers as to what prices ought to be for scrap.

(*For complete prices see page 652*)

Selling Into Second Quarter

Pittsburgh, March 6.—Manufacturers of cold rolled strip steel have opened books for delivery in the second quarter of the year, at prices ranging from 7c to 8c, base. Most manufacturers now have enough tonnage on their books to maintain present rates of operation through the third quarter of the year. Numerous inquiries are pending for shipment abroad.

Mining Men in the South

Lake Superior Mining Institute Holds Convention in Birmingham—Many Prominent Men Attend

Birmingham, Ala., March 14. (By wire.)—The southern meeting of the Lake Superior Mining Institute is proving a huge success. A large number of members from all points on the iron ranges left Chicago at 11:30 p. m., Saturday evening, on a special train furnished by the Queen & Crescent route. Other members and guests joined the party at Cincinnati Sunday morning. The trip from Cincinnati to Chattanooga was made by daylight on Sunday, affording the members an opportunity to inspect the pig iron manufacturing and other industrial developments of eastern Tennessee. Monday was spent visiting points of historical and industrial interest at Chattanooga. The special train arrived in Birmingham early Tuesday morning. An unusually interesting program has been outlined for the three-day visit in the Birmingham district.

Special Program Arranged

The Hotel Tutwiler, Birmingham, is the headquarters for the Lake Superior mining experts, and since the greater part of the stay is to be devoted to mine inspection and plant visitation only two business sessions will be held. The local committee has arranged an elaborate program of events which will afford the visitors unusual opportunity to familiarize themselves with the iron and steel operations of this district.

Tuesday's program included an inspection of mine No. 13 at Iskooda; Woodward Iron Co.'s blast furnace plant at Woodward; Edgewater mine at Edgewater, and the by-product coking operation of the Tennessee Coal, Iron & Railroad Co. and the wire plant of the American Steel & Wire Co., at Fairfield. The first business session of the institute was held at the Tutwiler, Tuesday evening.

Wednesday's program includes tours of inspection of the blast furnace plant of the Republic Iron & Steel Co., at Thomas, and the works of the Tennessee Coal, Iron & Railroad Co., at Ensley. The final business session will be held in the afternoon at the Tutwiler. On Tuesday a barbecue was held at Bayview and a stag entertainment is scheduled for Wednesday night at the Birmingham Athletic Club.

Special trips on Thursday include the following: Muscoda No. 4 and Raimund No. 1 iron mines and Edgewater coal mine of the Tennessee company; Sayreton coal mine, Republic Iron & Steel Co.; American Cast Iron Pipe Co. and the Colgate coal washer, Alabama Fuel & Iron Co.

Prominent Men in Attendance

Prominent iron ore operators from the Lake Superior region in attendance at the meeting include the following: Charles E. Lawrence, president, Lake Superior Mining Institute, Pickands, Mather & Co., Palatka, Mich.; A. J. Yungbluth, secretary, Lake Superior Mining Institute, Cleveland-Cliffs Iron Co., Ishpeming, Mich.; O. C. Davidson, Oliver Iron Mining Co., Iron Mountain, Mich.; William Bond, Newport Iron Mining Co., Ironwood, Mich.; Thomas Hoatson, owner of copper mining properties, Laurium, Mich.; J. S. Lutes, Tod-Stambaugh Co., Duluth; M. E. Richards, Judson Mining Co., Crystal Falls, Mich.; J. T. Reeder, Tamarac-Osceola Mining Co., Houghton, Mich.; W. J. Travarthau, Corrigan, McKinney & Co., Bessemer, Mich.; J. R. Van Evera, Stevenson Charcoal Iron Co., Marquette, Mich.; W. J. West, Oliver Iron Mining Co., Hibbing, Minn.; C. H. Baxter, Loretto Mining Co., Loretto, Mich.; W. P. Chinn, Pickands, Mather & Co., Gilbert, Minn.; D. H. Campbell, Rogers-Brown Ore Co., Iron River, Mich.; Henry Rowe, Oliver Iron Mining Co., Ironwood, Mich.; E. A. Thieman, Florence Iron Co., Florence, Wis.; Wilbur Van Evera, Hill Mines Co., Virginia, Minn.; F. J. Webb, Republic Iron & Steel Co., Duluth; E. S. Grierson, Calumet & Hecla Mining Co., Calumet, Mich.; E. E. Hunner, Arthur Iron Mining Co., Duluth; F. H. Haller, Calumet & Hecla Mining Co., Osceola, Mich.; W. J. Richards, Copper Range Consolidated Mining Co., Painesdale, Mich.; Rudolph Ericson, Davidson Ore Co., Iron River, Mich.; Andre Formis, Bates Iron Co., Iron River, Mich.; E. D. McNiel, Chandler Mining Co., Virginia, Minn.; Merton S. Kingston, Jean Mfg. Co., Virginia, Minn.; W. H. Fraser and E. J. Oswald, Corrigan & McKinney & Co., Crystal Falls, Mich.; F. J. Smith, Oglebay, Norton & Co., Iron River, Mich.; William Trebilcock, North Freedom, Wis.; J. S. Wall, Iron River, Mich.

In addition to Secretary Yungbluth of the institute, the Cleveland-Cliffs Iron Co. was represented as follows: M. H. Barber, Nashwauk, Minn.; J. M. Bush, Ishpeming, Mich.; W. W. Graff and J. R. Reigart, Gwinn, Mich., and G. R. Jackson, Negaunee, Mich. This constituted the largest representation of any company in the Lake Superior district.

Ferdinand W. Roebling, secretary and treasurer of the John A. Roebling's Sons Co., president of the Trenton Brass & Machine Co., and interested in many other corporations, is seriously ill from a complication of diseases. He has been ill for several days. Mr. Roebling recently celebrated his seventy-fifth birthday with a dinner at the Lotus Club at Trenton.

Puddlers Affluent

Bi-Monthly Examination of Sales Sheets Disclosed High Prices

Pittsburgh, March 13.—The bi-monthly examination of sales sheets of selected mills manufacturing bar iron, sheets and tin plate, conducted March 10, at Youngstown, by officers of the Amalgamated Association of Iron, Steel and Tin Workers and by manufacturers' agents, developed price averages considerably above those previously prevailing. The average price of bar iron in January and February was 2.35c, entitling puddlers to $11.30 a ton for boiling in March and April, an increase of $1 a ton above the rate that prevailed during the first two months of 1917. Bar iron mill wage rates are the highest in the history of the trade in America.

The average sales price of Nos. 26, 27 and 28 gage steel sheets was found to be 3.40c, as against 2.80c in the preceding bi-monthly period. Wages of sheet mill employes in March and April will be 18 per cent above rates prevailing in January and February, and 37½ per cent above base.

Tin plate, during the first two months of the year, sold at an invoiced average price of $4.95 a box, giving employes in the tin plate division an additional wage increase of 14 per cent. Wages of tin plate employes in mills working under the wage scales of the Amalgamated Association are 29 per cent above base.

Wages prevailing in mills recognizing the Amalgamated Association likely will be offered in other plants, as has been the case for several months.

Will Install Electric Furnaces

Two heroult electric furnaces, each of 10-ton type, are to be installed by the Sizer Forge Co., Buffalo, for the production of forging ingots working with cold scrap. Licenses have been issued for these furnaces. The Carpenter Steel Co., Reading, Pa., has received the licenses to install two additional 6-ton heroult units. At present, the company has two other 6-ton heroult furnaces under license. All these furnaces will operate on cold scrap for the making of special steels.

Supreme Court

Hears Final Arguments for Dissolution of Steel Corporation

Washington, March 13. (By wire.)—Solicitor General Davis, of the department of justice, began to close the arguments in the Steel Corporation suit before the supreme court this afternoon. He will finish his case a half hour after court convenes tomorrow at noon. The Corporation side was closed this afternoon by C. A. Severance, preceded by Daniel A. Reed, who also represented the Corporation. Solicitor John William Davis gave a brief summary of the organization of the Corporation and explained the meaning of Sherman act, claiming that the latter has been and is being violated. If this is true, he claims the dissolution of the Corporation is justified. Both Reed and Severance laid particular stress on the production of steel by the Corporation and its competitors to show that the Corporation does not and cannot control or restrain trade and that it is gradually growing less in importance in the industry so far as the percentage of total output is concerned. They also quoted figures to show how much prices have declined since the Corporation was organized and insisted that the sharpest kind of competition now exists. R. V. Lindabury, in his plea for the Corporation, said that if ever a concern deserved to exist it was the Steel Corporation, because of the valuable public service it renders. He maintained this was no time to disintegrate a great industry especially while the country is mobilizing its industrial resources.

Will Increase Capital

George H. Boyd, president of the Valley Mold & Iron Co., Sharpsville, Pa., announces that plans are being completed for a substantial increase in the capital stock of the company. The company was incorporated in 1891, with a capital of $50,000. The capacity of the foundry now is more than 1,200 tons a day. The company owns the Alice blast furnace at Sharpsville, and is building a foundry at West Middlesex, Pa., which will receive direct metal from the Ella furnace, controlled by E. W. Mudge & Co., Pittsburgh.

Mr. Boyd announces that the control and management of the company will remain unchanged. The directorate will be increased to seven members, as follows: George H. Boyd, Floyd K. Smith, Frank W. Tickner, Edward H. Boyd, John Sherwin, Edward R. Tinker and Henry Lockhart Jr.

Edward M. Moore and W. A. Carrell, doing business as Edward M. Moore & Co., Pittsburgh, have dissolved partnership. This firm operates an iron and steel warehouse at 211 Second avenue, Pittsburgh. The business will be continued under the firm name of W. A. Carrell & Co.

Ingot Production

In February Closely Parallels the January Output

Thirty-one independent steel companies, which produce 38 per cent of the steel ingots turned out by all independents, have furnished *The Iron Trade Review* with their records of ingot production in January and February. These companies include some of the largest as well as some of the smallest independent companies.

The figures given in the accompanying table supplement the statistics published last week when 25 per cent of the independent steel production was shown.

The table shows that these 31 companies produced 574,541 tons of steel ingots in February and 642,849 tons in January. The decline of 68,308 tons does not correctly represent the comparative activity of the open hearth and electric furnaces and bessemer converters during the two months, as February had fewer working days. On the basis of average daily output, these companies produced 20,737 tons daily in January, and 20,519 tons daily in February. The decline of 218 tons in this daily average represents a falling off in February of a little more than 1 per cent. The table presented last week indicated a drop of 1.6 per cent.

Steel Ingot Output

FIGURES SUPPLIED BY 38 PER CENT OF INDEPENDENTS

	Feb.,	Jan.,
Basic open hearth ingots	436,593	492,112
Acid open hearth ingots.	8,177	8,739
Bessemer ingots	126,730	138,480
Electric furnace ingots..	3,041	3,518
Totals	574,541	642,849

Pig iron output in February fell off 7 per cent from January. The larger drop in pig iron production reflects the greater difficulties experienced in getting raw materials to the blast furnaces than to the steel furnaces.

George Orock, consulting engineer, 17 Battery place, New York, has let contracts for the erection of a power and lighting station and for the necessary equipment, including water turbine, piping, a 50-ton crane, etc., to be located at Trenton Chasm, near Utica, N. Y.

Officers Elected

By Chicago Branch of National Metal Trades Association

At the annual meeting of the Chicago branch of the National Metal Trades Association it was reported that the business of the membership was in highly satisfactory condition, and that none of the members was experiencing any strike difficulties, all troubles having been settled, according to Paul Blatchford, secretary. James Keeley, publisher of the *Chicago Herald*, described conditions in Europe.

The following officers were elected: President, O. A. Olson, Simonds Mfg. Co.; vice president, Gustave A. Roth, Roth Brothers; treasurer Willian Ganschow, William Ganschow Co.; secretary, Paul Blatchford. On the executive committee besides Messrs. Olson, Roth and Ganschow, are T. A. Jones, W. A. Jones Foundry & Machine Co.; Charles E. Finkl, A. Finkl & Sons Co.; C. D. McDonald, McDonald Machine Co.; Prentice L. Coonley, Link Belt Co.; W. H. Strom, United States Ball Bearing Co., and Carlton L. Elmes, C. F. Elmes Engineering Works.

Over-Subscribed

Subscriptions by the employes of the Midvale Steel & Ordnance Co. recently announced by the company call for a number of shares almost double that offered in an original stock subscription plan announced in January. This plan presented the opportunity to the employes to subscribe for 6,000 shares of stock at a price of $60 per share. The number which each individual was privileged to subscribe for is graduated in accordance with the salary or wages received. The company has guaranteed that for a period of five years beginning with 1917, each employe will receive not less than $6 a share, annually, either in dividends or special payments.

Edouard Saladin, a French metallurgical engineer of note and well known in this country, died in New York on Feb. 12. He had been sent to the United States on a mission for the French government. Ettiene Orfila has been appointed as Mr. Saladin's successor.

M. B. Myers, formerly assistant to the vice president of the American Manganese Steel Co., Chicago, has been appointed sales manager of that company.

Coke Turns

First Sags, Then Advances—Supply is Short in All Centers

Pittsburgh, March 13.—Connellsville blast furnace coke for immediate delivery on Monday was offered at as low as $8.75 a ton, or $3.50 a ton below the price prevailing two weeks ago. The car supply yesterday was much better than even the most optimistic shippers believed it would be, and this accounts largely for the sharp decline in the price. Dealers today sold spot furnace fuel at $10 a ton at the ovens. Some of the more important cokemakers are asking $7, ovens, for shipment in the second half of the year. No contracts have been placed recently for 48-hour fuel.

The market for cupola coke for delivery after July 1 has been active. Many foundry cokemakers have disposed of the bulk of their output for the year ending July 1, 1918, at prices ranging from $6.50 to $7 a ton at the ovens. Foundry coke for immediate shipment is being held at $11 to $11.50 ovens. *The Connellsville Courier* for the week ending March 3 says production was 346,463 tons, a decrease of 6,998 tons, compared with the week before.

Coke Easier in East

Philadelphia, March 13.—Coke prices have continued to ease off. Spot furnace fuel has been offered to eastern furnaces this week at $10, ovens. There seems to be no trouble in buying fair-sized lots at this figure at present. Late last week there still were some sales of spot furnace coke to eastern buyers at $10.75, Connellsville ovens.

Big Ship Orders

Continue to Pour in From Great Britain—Famine in Ship Steel

New York March 14. (By wire.)—British shipping interests continue to place many ship orders in this country. The total of the Cunard contracts placed in this country are now said to exceed 40 vessels with 10 to 15 more pending. Conditions may force these boats to come under American flag. Only about half the steel needed for the Cunard contracts has been covered. The Royal Mail Pacific line also is reported to be negotiating for ships. The Texas Co. is in the market for steel for four tankers to be built at its Bath yard. There is a veritable famine in ship steel; practically nothing is obtainable before the second half of next year. Pacific coast yards have placed tonnage with the Steel Corporation for the first quarter of 1919. A flat price now being quoted by the latter on ship steel, includes both shapes and plates, and this varies from 4.50c to 5c, Pittsburgh, depending on tonnage and delivery.

It is estimated that 50,000 tons of ship steel has been placed within a few days. The Ames yard at Seattle is reported to have 10 Cunard boats.

More Railroad Business

New York, March 14. (By wire.)—The Alaskan engineering commission has placed a second lot of 10,000 tons of rails with the Illinois Steel Steel Co. for the government line in Alaska. The same maker has taken 8,000 tons from the Pere Marquette, which is in addition to an order placed with the Lackawanna Steel Co. Other rail orders to Corporation mills include 5,000 tons for the Virginia system; 5,000 tons for the Reading, 3,000 tons for the Duluth, South Shore & Atlantic and 2,000 tons for the Western Maryland. The Canadian Car & Foundry Co. is inquiring for steel in this country for Russian cars The Union Tank Line has increased its tank car order with the American Car & Foundry Co. by 1,000 cars and with the Standard Steel Car Co. by an equal number. The Southern railroad has bought cars of the Pressed Steel Car Co. and the Interborough subway bodies have been placed with the Pullman Co.

Canadian car builders have been offered 5,000 French cars but the business has not been closed. The Havana Central railroad is inquiring for 600 cars.

Shafting Goes Up

Pittsburgh, March 14. (By wire.)—The Columbia Steel & Shafting Co., effective March 15, will advance its price of cold rolled steel shafting to 5 per cent off the list for carload lots for delivery in the second quarter of the year. This price is $15 a ton above the previously prevailing minimum price offered by the same maker. No formal advances in prices of cold drawn steel, screw stock and shafting have been made since last autumn.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, March 13.—Continued lack of demand has had a softening effect on the metal markets, although this is reflected more by a few sellers here and there than by the market as a whole. During the week closing today, March electrolytic in some cases has sold as low as 36c, and third quarter has been offered at 31c. Either the lots available at concessions have been cleaned out or the holders have firmed up in their views, as business again has been done yesterday and today at the higher prices which recently have prevailed. On the basis of business booked, electrolytic may be quoted about as follows: Prompt and March shipment 36.50c to 36.75c, cash New York; April, 35.50c; May, 34.75c to 35c; June, 34c to 34.25c; third quarter, 31.50c. Some of the business of late has been transacted at higher than these prices, and the general tendency is to ask higher, particularly on third quarter. Prime lake copper is quoted nominally at 36c to 36.25c, cash, for March shipment, and casting copper at 33c to 33.50c, cash, for March.

The lead market, although statistically as strong as at any time in its history, is slightly easier due to the dull demand and the resultant willingness on the part of a few interests to offer slight concessions. Spot lead in New York now is quoted at 10c to 10.25c, New York, while shipment from the west is quoted as follows: March, 9.62½c to 9.75c, St. Louis; April, 9.37½c to 9.50c; May, 9c.

Demand for spelter is dull, although a fair volume of business was placed quietly last week; this, however, was not of sufficient proportions to influence the market. A few tonnages are offered at concessions. Prime western may be quoted as follows: Spot, 11.50c to 11.75c, New York; March, 10.50c to 10.75c, St. Louis; April, 10.25c to 10.37½c, St. Louis; May, 10c; June, 9.75c. Brass special now is quoted at a premium of about ¾c to ⅞c above the price of prime western.

The aluminum market is strong, by reason principally of the fact that certain sellers have not yet covered themselves on large tonnages of the metal which they have sold for export during the past two weeks. Otherwise the market is quiet. Prompt carloads are quoted as follows: No. 1 virgin 60c to 62c; No. 1 remelted, 56c to 58c; No. 12 remelted 39c to 42c.

The antimony market is somewhat uncertain and dominated by conflicting factors. The cost of laying down antimony in New York has been increased about 1c per pound, due to an advance in the ocean freight rate from Shanghai to the Pacific coast from $10 to $20 per net ton, and cabled advices from the Orient state that the market there continues to display an advancing tendency. In this market, however, certain second hands, some importers and at least two consumers are offering futures at concessions. Spot antimony may be quoted at 30c to 31c, duty paid, and shipment from the Orient may be quoted as follows: February, 17.50c to 18c, in bond; March, 15.25c to 15.37½c; April, 14.50c.

The tin market has been dull all week and prices have showed a declining tendency. Today Straits tin for spot shipment weakened and offers as low as 53c were not taken. The only futures being offered continue on far away positions, and today metal for June shipment from the Straits was offered at 47c, New York, without attracting interest.

(*For complete prices see page* 652)

Influence of Gases in Cast Metal

In this Article an Eminent English Metallurgist Discusses the Effect of the Action of Gases in Cast Iron and Steel Upon the Constituents of the Metal

BY J. E. FLETCHER

THE precise constituency of molten cast iron and steel is to a large extent unknown. That it must contain in solution iron, carbon, silicon, manganese, phosphorus and sulphur is known, but exactly how these metals and metalloids occur when in the liquid state cannot yet with absolute certainty be defined.

Our experimental evidence is gained from chemical analysis and microscopic examination from the solid material alone, but research has revealed the fact that the above named elements are largely present combined with one another, the constituents carbon and iron alone existing in the free state.

It may further be remarked that carbon and iron are usually found in both the free and combined state in all carbon-iron alloys, excepting perhaps that free carbon is not found in low carbon steels and iron in the pure state does not occur in the cast iron group.

These alloys solidify first and are followed by others in ordered succession. In cast iron, for example, the microscope reveals a constituent which is a mechanical mixture of iron carbide and iron, known as the eutectic, containing 4.3 per cent of carbon, and also another somewhat similar constituent containing 0.9 per cent of carbon, known as the eutectoid pearlite.

Now if quenching fixes the constituents present at the time of so doing then the microscopic representation of the quenched alloy must resemble closely that of the virgin molten metal. The author has made many such experiments in the way of quenching various carbon iron and other alloys from the molten state and believes that there are definite structures even in the liquid metal itself.

It is unconventional perhaps to consider eutectics as existing above the temperatures of their melting points, but it is certain that the 4.3 per cent carbon eutectic can be superheated to 1,500 degrees Cent., which is the melting point of iron, and on being quenched will still reveal under the microscope a characteristic stratified honeycomb structure. The silico-ferrite crystallites under such circumstances are small but of the characteristic fir tree or dendritic structure. It may be that there are liquid iron crystals as Quincke and Schenck have surmised, in a liquid matrix of eutectic composition and that these crystal forms and the eutectic structure are preserved by sufficiently brisk quenching from the molten condition. Gases are imprisoned or dissolved in all molten metals, and in cast iron and other eutectic-containing metals or alloys these gases are very probably the formative or directive element in the growth of the honeycomb-like formation of the primary eutectic. The flow line structure always having a direction towards the upper and hotter portions of the freezing mass of a eutectic ingot give the impression of fine gas streams set in motion by convectional forces just as the streams of steam bubbles are given convectional flow in a boiler. It may be that the primary gas streams in flowing through the semi-liquid carbide of iron plate-like crystals make the paths through which the more or less carburized ferrite enters and freezes, such freezing action being immediately afterwards followed by that of the carbide.

Fig. 1 shows a pure eutectic iron quenched in iced brine after superheating to 1,500 degrees Cent., 370 degrees above its melting point. Fig. 2 illustrates a cast iron quenched from above the melting point, while Fig. 3 shows the same iron when slowly cooled to room temperature.

The structure of a cast iron must have some relation to the primary structure it received in the blast furnace. The iron was reduced there from the ores, and descending became carburized by contact with the coke and carbon monoxide gas, the latter being the chief carbonizing agent. As it approached the hot zone of the boshes it absorbed sufficient carbon to make a fusible alloy and in such state flowed down into the hearth having a composition approximately that of the eutectic and having by that

An abstract of a paper presented at a meeting on Nov. 27, 1916, of the Birmingham branch of the British Foundrymen's Association.

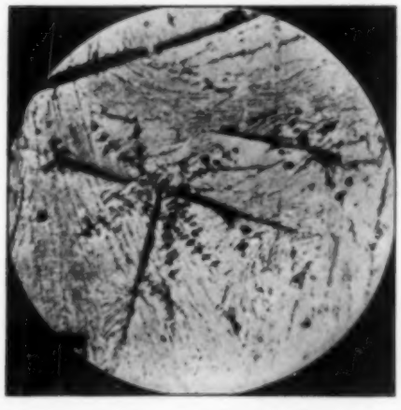


FIG. 1 — PHOTOMICROGRAPH OF A PURE EUTECTIC IRON QUENCHED IN ACID BRINE FROM 1,500 DEGREES CENT.

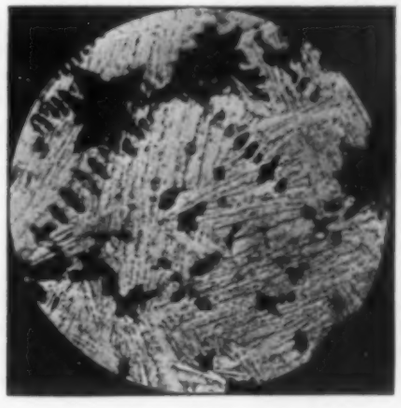


FIG. 2 — PHOTOMICROGRAPH OF A CAST IRON QUENCHED FROM ABOVE THE MELTING POINT

FIG. 3—PHOTOMICROGRAPH OF THE SAME CAST IRON IN FIG. 2 WHEN SLOWLY COOLED TO ROOM TEMPERATURE

FIG. 4—FRACTURE OF CAST IRON INGOT SHOWING THE DIRECTION OF THE PRIMARY CRYSTALS

time probably a distinctive structure. If this eutectic alloy has not absorbed enough carbon to become the true 4.3 per cent carbon eutectic or if it becomes bessemerized by the blast then iron crystals are thrown into the eutectic and the structure has then the constituency of iron crystals plus eutectic.

These crystals become more or less carburized but though they grow during the slow cooling in the casting bed they preserve their entity, possibly permanently, since they may be found as part of the crystalline structure of a mild steel. Let us briefly consider the changes which take place during the reduction of the ore in the blast furnaces and further to the completion of the alloying period in the hearth. While the ores are being reduced, the oxides of silicon, manganese and phosphorus remain unaffected. During this period the iron oxides are attacked by the carbon monoxide gas which is the principal reducing agent, as it is the chief carburizing medium. Now each particle of iron oxide must come into contact with the reducing gas or with the carbon of the coke. The latter contact cannot be so great a factor as is sometimes considered, since the coke descends in large measure unbroken into the hearth. It is well known that the reduction of the ore is accomplished by means of the gas CO; about 1.2 pounds of the gas CO_2 are set free for each pound of iron reduced. At the temperature of such reduction, say at 1,400 degrees Fahr., the volume of the gas is about three times its bulk at 60 degrees Fahr., hence it will be possible to prove that each pound of iron oxide, Fe_2O_3, in the ore when attacked by the gas CO liberates over 5,000 times its volume as CO_2 gas. It is not, therefore, difficult to imagine that as a result of such gaseous action the porous nature of the reduced iron is aptly called spongy. This may be called the first stage in the gas absorbing tendency of iron, for it is impossible to reasonably conclude that within the meshes of the spongy iron there can be freedom from gas imprisonment.

The presence of hydrogen in the gases imprisoned by this action is readily understood when we consider that the gases which attack the ores are a mixture of moisture evaporated from the blast, ores, flux and fuel; air; carbon dioxide gas from the decomposition of the limestone; and carbon monoxide gas, CO, produced by the incomplete combustion of the coke and liberated by the ore which is partly reduced by direct contact with the carbon of the coke.

The fracture of the metals conveys a great deal to the practiced eye, and an examination of the upper surface

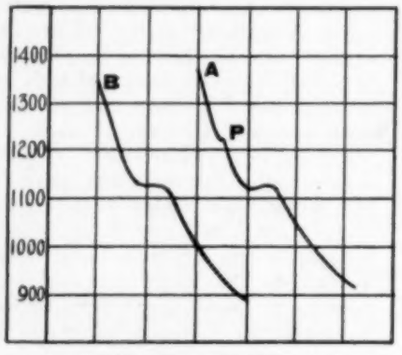


FIG. 5.—COOLING CURVES OF LOW SILICON PIG IRON

of cast iron as it runs into the pig bed and of its cooled exterior is often an index as to the effect of carbon, phosphorus and silicon. But the microscope is an invaluable and indispensable aid to the structure as is the recording pyrometer to the behavior of the metal from its freezing point to the cold state. The use of the microscope, however, is an acquired art which requires long practice and it cannot be too strongly urged that the effects of temperature, slow and rapid cooling, the influence of mass on the structure of cast iron and steel of many varying analyses be studied closely before the microscope can yield really useful results. Similarly the cooling curves taken from small samples may be misleading. Thus two small ingots of cast iron may be made from the same pig, one being carefully protected from oxidation during melting, the other free to surface oxidation. If such samples are melted and superheated to temperatures much in excess of their actual fusion point, the cooling or freezing point curves will be dissimilar though there may be but little difference in the two analyses.

A low silicon pig iron was melted and the cooling curves taken were as shown in Fig. 5. The break in the curve *A* indicates the fact that the iron oxide formed during the superheating of the sample had partially oxidized the carbon of the carbide and had caused a separation of free iron crystals from the eutectic. This separation takes place at a higher temperature than that of the normal pig iron and is shown by the break in the curve at the point *P*.

In the study of the gas influence the principal use of the microscope is in tracing the difference in crystalline structure between the outer rapidly cooled and the inner slowly cooled zones of a casting. If the cooling curves are taken simultaneously at each of these zones then in many cases the difference in the freezing behavior with its action on the phenomena of shrinkage and contraction may be observed. Thus in a high phosphorus iron there is considerable segregation of the phosphorus as phosphide eutectic towards the center of the casting mass and it is not unusual to find this reflected in the cooling curves taken from the exterior and the interior of the casting. The reason is, of course, that the higher phosphorus content of the interior lowers the freezing temperature at that point.

Just previous to freezing of cast iron or steel the liquid metal may be conceived to consist of an agglomeration of liquid particles or crystals of iron more or less carbonized, silicide and phosphide of iron, carbides of iron and manganese, and of the sulphides of iron and manganese. Crystallites or fir tree shaped dendrites of partly

FIG. 6—FRACTURE OF CAST IRON INGOT SHOWING THE DIRECTION OF THE GAS STREAMS

carburized iron in the midst of a mother liquor which is made up of carbide, phosphide, silicide and sulphide of iron, and of manganese carbide and sulphide, first separate out and freeze at the mold surface and at right angles to it. Almost immediately afterwards the silicide of iron freezes around the iron crystallites. These crystallites as they freeze eject their occluded gases which they originally contained, into the mother liquor or eutectic. As the iron or silico-iron crystals elongate and grow laterally the gases are driven inwards, producing a flow of the mother liquor in that direction, toward the hot and fluid mass center. The volume of any such partially frozen portion of the metal is as follows: Primary crystals, A + mother liquor, B + ejected gases, C. As A increases B decreases, while C simultaneously decreases. In cast iron the mother liquor B contains the segregates, slag, oxide and sulphide particles, together with the graphite flakes which escape with the gases into the hot fluid portions which, when frozen, contain the highest percentages of these impurities. The gases thus liberated travel to the hot zones in the castings which are the last to freeze. If there is no way for these gases to escape to the surface of the ingot or casting or by way of a riser, then gas cavities or pipes must occur. The function of feeding is therefore evident. As freezing progresses from the outside of a casting inwards, driving the gases to that point, unless a path is kept clear, and hot fluid metal can take the places of the gas bubbles or streams, gas cavities or spongy spots must remain.

Path of Ejected Gases

In a square ingot the crystals forming at the surfaces of the chill mold start freezing at right angles to the cooling surfaces. The crystals forming at the corners must meet one another in their growth and a plane of weakness is produced at each corner of the ingot. At the bottom of the mold crystals grow which in freezing meet the crystals growing from the sides and there is formed a pyramid whose surfaces are planes of weakness. Along these planes the ejected gases travel together with the segregates and slag particles, eventually reaching the central axis of the ingot through which they ascend to the ingot top. The action of the gases which escape into the mother liquor when the primary crystallites begin to form and grow is much more important than has been generally considered. The natural tendency of the primary crystallites to grow at right angles to the mold side or chill surface is disturbed in many cases by the influence of the gas streams whose direction is always towards the point of easiest escape. This direction of flow is of course towards the hot fluid mass centers and naturally upwards. In a series of small cast iron ingots of taper form the direction of the gas streams and of the primary crystals is clearly seen in the fractured surface as illustrated in Figs. 4 and 6. This surface when polished and etched was examined under the microscope and it was concluded that the curved lines of the fractured surface corresponded to the directions of the long axes of the primary crystallites and to those of the plate-like crystals of the eutectic.

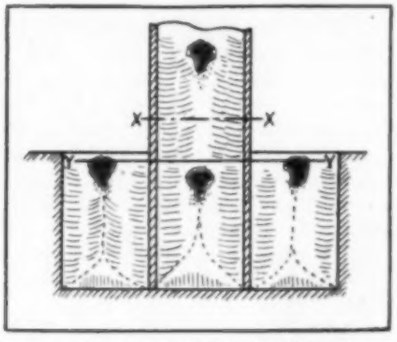


FIG. 7—ILLUSTRATING PIPING IN A GRAY CAST IRON BLOCK

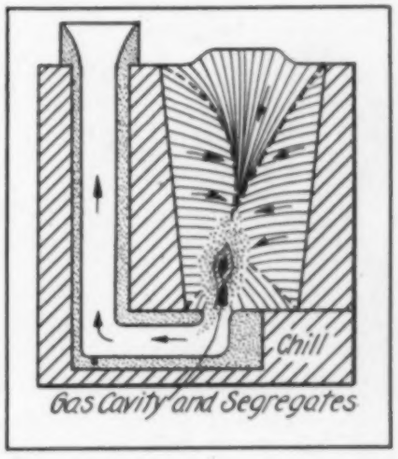


FIG. 8—SHOWING THE EXIT OF GAS TOWARDS THE VENT, AND THE DIRECTION OF THE GAS PATHS DOWNWARD

When there is no exit at the top of a casting whereby the liberated gases can escape these will flow towards the vent wherever this is placed and in one case a downward flow was observed. A small ingot was run from the bottom through a trumpet runner as commonly used in the casting of steel ingots in closed top molds. The mold was first filled with molten slag which was immediately afterwards displaced by molten-white cast iron. The result of the experiment, shown in Fig. 8, was that the gas paths ran downwards. In cast iron ingots the phosphide of iron and the sulphides together with the graphite liberated, travel along the planes of weakness, being assisted by the propelling motion of the escaping gases.

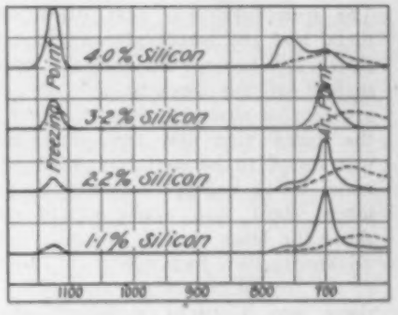


FIG. 9—DILATION OF CAST IRONS; THE INFLUENCE OF 2-PER CENT MANGANESE IS SHOWN BY THE DOTTED LINES

Shrinkage is Vital Problem to Foundrymen

An important question arises in connection with the phenomenon of shrinkage. Is the phenomenon of shrinkage connected with the volume of occluded gases, or rather with that of gases escaping during the freezing of iron and steel? There are many evidences in favor of such a conclusion. A case in point was that of a mild steel block which was cast from a ladle of well melted steel held in the ladle accidentally until close on the point of setting or congealing. The nozzle gave out and did not allow scarcely any steel to rise in the casting head or riser. When cold the block was found to have contracted less than 1/16-inch per foot. The metal when planed revealed no pipe or cavity and was free from blow holes. The weight of the casting indicated soundness. This case points to the fact that the gases escaped freely during the slow rising of the steel in the mold and that the occluded gases finally remaining in the metal mass were in a fine state of entanglement between the crystals, uniformly throughout the mass. A similar casting made in the same heat from a more fluid steel piped deeply in the rising head and contracted normally at the rate of 0.2-inch per foot.

In another case a gray cast iron cylindrical block was cast, in the center or axis of which was fixed an iron tube twice the depth of the block, as shown in Fig. 7. The molten iron was run into the mold surrounding the central tube or core.

The iron tube was next filled with metal and the whole allowed to cool slowly. When parted near the upper surface of the block at *YY* the expected ring-shaped pipe was found in the outer ring but the inner tube was found to be perfectly filled with metal which had not contracted. The inner ingot was again parted just above the block at *XX* and here again no contraction had occurred, though at the top of the inner tube or ingot there was a slight shrinkage. Two gas cavities were found in the inner ingot, one at the top and another almost opposite the top of the cylindrical block. The explanation would seem to be that the metal in the lower half of the inner ingot, being surrounded by a heated mass of the same temperature froze so slowly that it ejected its gases axially and upwards, the bubbles being perfectly replaced by liquid metal. Hence the lower half of the central ingot did not contract. The escaping gas met the bridge of congealed metal just above the block and was imprisoned, forming the lower cavity. The gases in the upper half of the tube escaped to the top forming the usual pipe.

Whenever castings are made in chilled molds there must be shrinkage or contraction. Under such circumstances, rapid freezing has a tendency to form small primary crystals which become quickly interlocked imprisoning small gas bubbles. The cooling of the mass causes a shrinkage of the gas bubbles and it has been concluded that each gas globule occupies much less volume at 60 degrees Fahr. than at 2,000 degrees Fahr.

Great strides have been made in the United States in foundry science in showing how volumetric change during the freezing and later cooling of iron varies with differing analyses. The clearest illustration of the relationship between the chemical anlysis of cast iron and the behavior during cooling from the freezing point with the accompanying shrinkage has been given by Professor Turner. He has related the freezing and the shrinkage curves and in typical cases has shown that each grade and type of pig iron expands on freezing and shrinks in its own characteristic way. It was believed by Professor Turner with Messrs. Goe and Hague that when either silicon, manganese or phosphorus was added to a pure carbon iron, either singly or together, there was an expansion at the moment of freezing. In white cast iron containing about 3.5 per cent carbon and 96.5 per cent iron there is no such expansion but a rather rapid shrinkage or contraction. The addition of silicon alone up to 3 per cent increases the expansion regularly and similarly the addition of manganese alone up to 2.5 per cent increases the primary expansion, the amount of such expansion per unit of the metalloid added being roughly the same in silicon as in manganese. Now when the two elements, silicon and manganese, are added to the 3.5 per cent carbon iron it is found that the primary expansion is increased and if a third element, phosphorus, is added there is a further increase. In all cases there is a halt in the rate of shrinkage and often a considerable second expansion when the recalescence point known as the pearlite point, is reached during the cooling down from the freezing or solidification point.

Percentage of Composition and Shrinkage Per Unit of Volume of Iron

Combined carbon.	Graphite.	Si.	Mn.	P.	Volumetric contraction.	Class of iron.
0.45	3.33	2.8	1.2	0.8	1/125	Coarse gray
0.40	3.01	1.5	1.3	0.4	1/100	Light gray
0.95	2.35	1.0	0.4	0.7	1/77	Mottled
1.20	2.15	0.9	0.2	0.4	1/75	Mottled
1.50	2.10	1.0	3.2	0.5	1/68	White iron
5.00	0.20	0.7	11.2	0.1	1/60	Spiegel

Just after freezing commences, when the primary fir tree type of crystals begin to form next to the mold surface, a certain amount of the iron carbide decomposes and is thrown out into the mother liquor as graphite flakes. This is one possible reason for the primary expansion. But when these silico-ferrite crystallites form they liberate a certain quantity of heat and at the same time eject a considerable volume of the gases which they held in solution when liquid. These gases, when thrown into the thin fluid mother liquor, would contribute to the expansion of the whole metal mass at that moment. When phosphorus is present the mother liquor is made increasingly fluid and is capable of holding more gases in solution, permitting their ready flow. The gases then, as may be argued from the appearance of the micro-structure as quenched in this range of temperature, must be widely distributed as minute bubbles. At the point of recalescence there is another expansion generally, connected, as Professor Turner suggests, with the liberation of more free carbon or temper carbon, and probably with a further increase in the volume of the gases as a result of the heat evolution which then takes place. Baker in his experiments on the quantity of gases drawn off from iron and steel heated in a vacuum decided that the greatest quantity is ejected at the recalescence point, thus confirming the work of the earlier investigators, Troost and Hautefeuille, and Muller. More recently Charpy concluded that the expansion or dilation of carbon-iron-silicon alloys was increased at the freezing point as the silicon content rose, while the expansion at the recalescence point is diminished, as the plotted curves in Fig. 9 show. This conclusion confirms experiments made by the author on cast irons with varying silicon content some years ago when it was further found that manganese and silicon together intensified such action. Generally speaking, white irons shrink most, the more highly silicious irons shrink last. It is believed that silicon and aluminum tend to retain the gases in a fine state of division within the cooling mass, the decomposition of the carbide of iron is facilitated, graphite liberated with considerable evolution of heat while the primary crystals are being formed or frozen. Hence gray silicious irons solidify slowly and shrink least because of the occluded gases present in the mother liquor which is the ideal condition for the free growth of the graphite flakes. It would seem that whenever the iron carbide in either the primary crystals or in the eutectic is retained, as is the case when manganese or chromium is present, the speed of freezing is increased and the gases liberated are driven rapidly into the more fluid portion of the metal mass where there is a tendency to form shrinkage cavities. In low silicon irons free from phosphorus, high manganese generally produces such results especially if the casting temperature is low. In the case of high manganese irons with high carbon content used in rapidly cooled castings the difference in the shrinkage rates between the outer freezing zones high in combined carbon and the inner zones of gray iron, not rarely results in pulls or draws in the outer skin. This is true especially in the neighborhood of internal corners where three planes meet. The pres-

ence of phosphorus is an aid to gas escape into the hot interior of a cooling casting. The increased fluidity given by reason of the fluid phosphide eutectic makes it easy to feed castings made from metal containing above 0.4 per cent phosphorus. The feeding process is really the means of supplying liquid metal to take the place of the gases which are being liberated as the primary crystals are growing at the expense of the gradually diminishing mother liquor. When by reason of low carbon content the constituency of a cast iron is steely in its nature then there is great danger of internal sponginess.

Hot Casting Permits Escape of Gas

The question of hot casting is, of course, allied with the problem of shrinkage and of gas exit. Generally it may be stated that when the metal is hot cast, when its molten temperature is higher than that necessary to simply melt it, the gases which are liberated during freezing are driven into the hot interior and as they escape to the risers their place is taken by liquid metal. There is a better distribution of the gases which remain in the cold metal and less risk of blowholes and gas cavities common with cold cast metals.

With hot cast metal these gases are more uniformly distributed throughout the casting, a greater part escaping through the risers or feeding heads. The importance of hot casting will be at once seen when dealing with pure irons of hematite and cold blast character, low in total carbon, phosphorus and silicon. Such iron cools and shrinks rapidly because its primary crystals freeze at a high temperature, and the mother liquor being more purely eutectic, freezes rapidly. Being difficult to feed, owing to the passage through the "pasty" stage, the gases pent up in the mass centers of the casting become frozen in and remain as shrink holes or gas cavities. Cast irons which are high in silicon and phosphorus do not suffer from the slow freezing of the eutectic. The mother liquor, which is a kind of compound eutectic, has a longer freezing range than the simple 4.3 per cent carbon eutectic. Moreover, during the freezing of the primary crystals the carbide of iron decomposes, graphite being liberated. The heat evolved keeps the mother liquor in a fluid condition and there is no "pasty" stage. Anyone who has observed the puddling of such irons will understand the difference between the behavior of a white refined iron of the old refinery plate type and that of a Lincolnshire gray pig iron. The latter is liquid for a much longer period than the former, and is most difficult to puddle, because the primary crystals remain for so long in an almost fluid state. Manganese retains the carbide in the eutectic and is an aid to rapid freezing. It also stiffens the primary crystals. It has a powerful effect in conjunction with silicon in suppressing the heat evolution at the pearlite point as the cooling curves show. It has been generally noticed that such suppression of the pearlite point, if accompanied by a lowering of the freezing point, indicates a tendency to rapid freezing of the primary crystals which are found to retain the austenitic condition even when slowly cooled.

With reference to the character of the gases occluded in iron and steel, a great deal of research work has been done, notably by Dr. Baker. Gases exhausted in a vacuum from cast iron and steel at temperatures in excess of 900 degrees Cent. have given the following analyses:

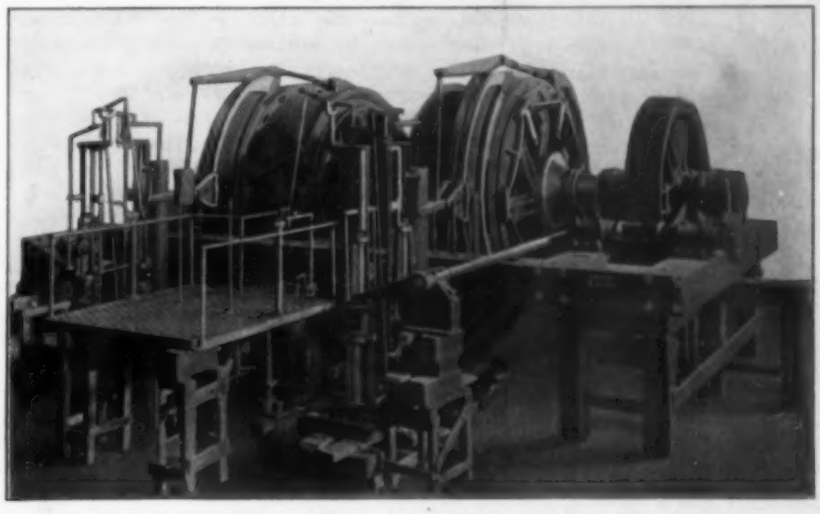
INCLUDED GASES IN IRON AND STEEL

	Per cent, by volume.
Carbon monoxide	45 to 50
Hydrogen	45 to 55
Carbon dioxide	0 to 5
Methane	0 to 3
Nitrogen	0 to 4

The importance of taking into consideration the influence of gases in the foundry problem can scarcely be underestimated. Unless efficient means are taken to secure the easy escape of gases liberated during the solidification of cast iron and steel the occluded gases which remain entrapped expand again during the recalescence and may do further damage. The major portion of foundry troubles are associated to a certain degree with the question of included gases. The gases which are set free at the mold surfaces due to the driving off of moisture in the sand washes or molding composition or of volatile matter, belong to a different category and should of course be dealt with separately. The practical value of investigations is seen when the compositions of pig irons are compared with their shrinkage per unit volume during the cooling down from the freezing point to the temperature of the atmosphere. The figures shown in the accompanying table may be found useful in supplementing the observations which have been described.

Builds Large Hoist For Japan

The Nordberg Mfg. Co., Milwaukee, Wis., has recently shipped through Mitsui & Co. a large electric hoist for installation at the Ashio copper mines of Furukawa & Co., Tokyo, Japan. Furukawa & Co. is the largest mining company in Japan and according to a recent statement, its mines and plants have an annual production of 38,000 tons of copper, 200,000 tons of copper ore, 1,500 tons of sulphate of copper, 18,000 tons of bare copper wire and over 3,000,000 tons of coal.



ELECTRIC HOIST WITH 10-FOOT DRUMS FOR JAPANESE COPPER MINE

The Ashio mines, at which the new hoist is to be installed, are the largest copper producing group owned by the company. The design of the hoist is in general similar to many other electric hoists built by the Nordberg Mfg. Co. for installation in this country. The drums are 10 feet in diameter and provide for hoisting in an 1,800-foot shaft. The drive is by motor through cut herringbone gears, power being supplied from a nearby hydro-electric plant. The hoist is shown in the accompanying illustration.

Reminiscences of the Ore Districts

A Sketch of the Development of the Lake Superior Ore Ranges Dating From the Year 1873, When the Shipments of Ore, Amounting to About 1,250,000 Tons, Were Thought to be Excessive

BY JOHN M. LONGYEAR

MY FIRST acquaintance with the Lake Superior region was in 1873, when, on the first day of June, I arrived in Marquette on the steamer ROCKET, having passed through 40 miles of ice between Grand island and Marquette. At that time, the Lake Superior iron district was Marquette county, there being only one small mine just over the line in Houghton county (now Baraga county), the Spurr mine.

In the year 1873, the total shipments of iron ore were about 1,250,000 tons, and there were "calamity-howlers" who deplored the wasteful extravagance of shipping so much iron ore in one year and ruining the market. The schooner PELICAN had taken, during that summer, a record cargo of 1,250 tons, and there were those who protested against the attempt to use such large vessels in the ore trade, claiming that large vessels like the PELICAN could never be made to pay on the lakes. In view of the recent outputs of the iron ore districts of Lake Superior and of the size of the ordinary cargoes now carried by vessels on the Great Lakes, these figures seem absurd, but they were taken very seriously by many well-posted people in 1873.

Marquette was a thriving little city of about 3,000 population, and was the only port on Lake Superior from which iron ore was shipped. An ore dock had been built the previous year at L'Anse, but was very little used and was demolished a few years later.

Lumber Industry Among the First

In 1873, the upper peninsula of Michigan was an undeveloped wilderness and nearly all covered with a heavy growth of standing timber. The only railroads were the lines from Marquette to L'Anse, from Negaunee to Escanaba and Menominee, and the narrow-gage road between Hancock and Calumet. Besides these there were a few short spurs to mines. There were very few wagon-roads, and these generally of the roughest character, commonly known as "tote-roads."

My first visit to the Menominee iron range was in 1874, while I was engaged in examining the scattered tracts of state land, known as the State mineral reserve; certain state lands having been withheld from market for possible mineral values. On the request of Governor Bagley, A. B. Wood of Owasso, Mich., and I were examining these lands for the state. We left Republic, in a flat-bottomed skiff, and proceeded down the Michigamme river, making numerous portages and side trips to visit the reserve lands lying west of the river. At the Grand portage, about three miles above the mouth of the Michigamme river, we lost our boat and the rest of the journey was made on foot. We camped one night at Twin falls on the Menominee river where the hydro-electric station of the Peninsular Power Co. is now situated. A tote-road had been brushed out to this point, and the tracks of the one wagon which had penetrated that far into the wilderness, a few weeks before, were visible.

From Waucedah to the railroad at "42," now Powers, we followed a winter road through a dense cedar-swamp, the surface of which was from 6 inches to 3 feet under water. It was hard walking for we could not see how deep the water was, but it was the best going there was. The route of this road was near the present line of the Chicago & Northwestern. The swamp is mostly cleared away and many excellent farms occupy the greater portion of the former extensive cedar-swamp.

Iron ore had been reported in various places on the Menominee iron range when the United States linear surveys were made about 1850. Some exploring had been done in 1868 to 1870, but nothing of importance had been found. The early explorers had based their work and opinions of the district on their knowledge of the Marquette district, and it was several years before they realized that the formations were quite different.

The Menominee Mining Co., composed of Milwaukee and Menominee people, was the first to take any practical steps in the way of developing the district. Its first request for a branch track from the Chicago & Northwestern was refused. The railroad had consulted one of the prominent explorers who had done some work on the range, and he had expressed the opinion that there was not enough ore in that district to justify building a road. The Menominee company insisted on having the railroad, and the officers of the mining company finally personally guaranteed the Chicago & Northwestern against loss should it construct a branch about 24 miles in length from Powers to the present station of Quinnesec. Powers was then known as "42." The branch road was finally built in 1876-77, and my first acquaintance with the development of the region was in 1877, during which time I made several visits to Quinnesec, riding on a construction train from Powers. There were no regular passenger trains until the following year. At that time the Menominee company had camps at Waucedah, Vulcan and Quinnesec, and for several years Quinnesec was the terminus of the road, and the headquarters for the extensive lumber operations in that district, and all the explorers and miners engaged in the development of the iron ore deposits.

First Map in 1879

In 1879, I published the first private map of the Menominee range. The first option for an iron ore lease issued by me was given to Hon. S. S. Curry, on the W½ of the NE¼ of section 9, T. 39 N., R. 29 W. This property had been explored by Dr. Credner, a German geologist, working for the Canal Co. in 1868. He had dug a trench from the bottom of the hill, exposing the formation continuously for several hundred feet. Then, to avoid the difficulties of digging among the roots of some very large trees, he had offset to the west about 100 feet, and continued his trench across the formation, apparently exposing the entire ore-bearing belt. Mr. Curry, looking this work over one day, wondered why the pine trees which occasioned the offset were so much larger than the other timber in their vicinity, and as a preliminary to answering this question to his own satisfaction, he applied for and obtained the option above mentioned.

On returning to the property he set his men to work digging a pit between the trees, and within 20 minutes the men were shoveling out a high-grade iron ore, and within two weeks iron ore was being shipped from the property, which was named the Curry mine.

From 1878 and through the early eighties, a very large amount of exploring was done in the Menominee district. In 1880 the railroad was extended to Florence, Wis., where two

From a paper presented at the twenty-first annual meeting of the Lake Superior Mining Institute, Birmingham, Ala., March 13 to 16, 1917. The author, John M. Longyear, is general land agent, Marquette, Mich.

mines, the Florence and the Commonwealth had been developed, and the famous Chapin mine at Iron mountain had been opened. The Norway and Cyclops mines were opened by the Menominee Mining Co. in 1878 and 1879. The Cyclops was not a large deposit but yielded a very high-grade ore.

In 1881, I had a magnetic survey made showing the dip-needle attractions over the iron formation from Waucedah to the Menominee river, northwest of Iron mountain, a distance of about 18 miles. This survey was of considerable service in laying out exploring work along the range. The line of maximum attractions being south of the ore deposits made an excellent guide in planning exploring work.

My first visit to the Crystal Falls iron district was in 1874, while examining the State mineral reserve lands, but at that time I saw no indications of iron ore. I was again in the same township in 1877, when I noted indications of iron formation southeast of the present city of Crystal Falls. In 1877, extensive forest fires had damaged much pine timber in this region, and I visited it for the purpose of learning the extent of the damage to our property. At this time there were no roads or trails in that district. In crossing the pine plains southeast of Crystal Falls near the Brule river, I met a party of lumbermen making a tote-road north from the Brule river to Paint river in section 28, T. 43 N., R. 32 W., where the lumbermen were preparing to cut and save their damaged timber. This was the first road into the Crystal Falls district.

In 1880 or 1881, I visited the property which afterwards became the Mastodon iron mine. Here, in a small swamp on swale, I saw an outcrop of clean, hard hematite ore, rising 4 or 5 feet above the surface of the ground, and perhaps 75 or 100 feet in length. Standing on the outcrop of ore was a large dead cedar tree, which had been blazed years before, and on the blaze was written in red chalk "Bojoo Nitche" (Chippewa for "Good morning my friend").

The first good ore found in the Crystal Falls district was on the property now known as the Great Western mine.

The Gogebic Iron Range

United States linear surveys made about 1850 mentioned outcroppings of iron ore on what is now known as the Gogebic iron range, in Section 7, T. 47 N., R. 45 W. The next official reference to iron ore in that region was made in the state geological report in 1873, in which Brooks and Pumpelly devoted two pages in describing a reconnoissance in that region a year or two previous. Mr. Brooks told me in the spring of 1882, that at the time of the reconnoissance, he and Pumpelly did not think much of the district. At the time of their visit no Lake Superior ore was considered of value, except the speculars and magnetites. The furnace operators were beginning to use the hematites and limonites in 1873, when I made my first acquaintance in the Lake Superior district, but they were used with much hesitation even by the more courageous furnace operators, and the soft ores were then derisively designated "Lake Superior mud." In 1877, acting for the Lake Superior Ship Canal Railway & Iron Co., I employed Frank H. Brotherton, of Escanaba, to examine the timber and surface mineral indications in Township 47 N., Ranges 44 to 47, inclusive. I subsequently published a map for the Canal company, embracing the entire west end of the peninsula, from Range 38 W., on which the iron range as laid out by Brotherton was indicated.

Magnetic Surveys Invaluable

The excellence of Brotherton's work is shown by the fact that a few changes in the map have been found necessary by the subsequent developments, and that map on a larger scale subsequently published by the Canal company was of immense service in the development of the Gogebic iron range, Brotherton traced the iron formation from the Montreal river, easterly to the center of Range 44. The magnetic survey was finished by L. E. Paddock, a few years later, when the formation was traced from the center of Range 44 easterly across Range 43, until the magnetic indications ceased near the east line of Range 43.

In the winter of 1880 or 1881, I issued my first option on the Gogebic iron range to William Sedgwick, of Ishpeming, who was associated with Captain "Nat" Moore, in exploring property since known as the Colby mine, in the NE¼ of Section 16, T. 47 N., R. 46 W. I issued two options to Mr. Sedgwick, covering the N½ of Section 15, now known as the Tilden mine.

These explorers found the ore on the Cobly property, and also that part of the ore deposit on Section 15 adjoining.

The first ore was found by them at what was afterward known as the Nipigon pit. It is curious to note that the first merchantable ore found on the Gogebic range was in what was probably the smallest deposit from which ore was shipped, as this pit yielded only about 3,800 tons in all.

In the year 1881, the Cambria Iron Co., Johnstown, Pa., conducted extensive explorations on the Gogebic range and in the vicinity of the present city of Bessemer, but early in 1882, this company abandoned its Gogebic explorations and purchased the greater part of the mines of the Menominee Iron Mining Co. on the Menominee iron range.

In the spring of 1882, A. Lanfear Norrie took options and explored lands in Sections 22 and 23, T. 47 N., R. 47 W. in the present City of Ironwood. His work was in charge of James R. Wood, an explorer of ability and experience. Norrie's first, or summer camp was on the Montreal river, at the place now crossed by the bridge of the Chicago & Northwestern. He later built a log camp in what is now the south part of the city of Ironwood, and this camp was used for several years after the city was built up around it.

My first visit to the Gogebic range was in the latter part of August and early part of September, 1882. From Ashland we traveled by sail boat, on Lake Superior, to the mouth of Ironton creek a few miles west of the mouth of Montreal river. The explorers had built a warehouse at this point, and a pony trail from it to the iron range, at what is now the Montreal mine; thence along the range to Sunday lake. Another pony trail was made from the mouth of Black river to the site of the present city of Bessemer.

After spending a few days at the Norrie camp, we moved down to the camps near the southwest corner of section 18, T. 47 N., R. 46 W., where, a day or two later, a messenger brought us samples from the first pit bottomed in merchantable iron ore on the property later known as the Norrie mine. This pit was sunk at the narrowest point in the ore deposit, which was about 3 miles long. At this point it was only 2½ feet wide. Subsequent development showed that the ore was anywhere from 100 to 250 feet in width a short distance either side of this pit.

We also spent a few days in a log camp on Section 10, T. 47 N., R. 46 W., on the site of the present city of Bessemer. This camp stood near the spot now occupied by the Soo Line railroad station and from here we visited the explorations which were afterwards developed into the Colby and Tilden mines. Captain Pease, who had had charge of the work accompanied me.

Early Estimates of Gogebic Deposits

After visiting all the pits then showing ore on the Gogebic range, I estimated there were at least 150,000 tons of good ore on the Colby and adjoining properties. Dr. Rominger, the state geologist, in the same year had made an unsuccessful attempt to reach the Gogebic range from the east, but only visited the then barren explorations east of Sunday lake. He afterwards was reported to have stated that he could carry away all the iron ore on the Gogebic range in his hat. In the following year, Captain Nat Moore and others interested in the explorations,

personally conducted him to the range by way of Ashland and showed him the pits in ore, whereupon he became quite enthusiastic over the prospects for iron ore in that district, and withdrew his former estimate of the tonnage.

The first railroad to reach the Gogebic range was the Milwaukee, Lake Shore & Western which was built from the southeast to Watersmeet, Wakefield, Ironwood, etc. In 1884, on my second trip to the Gogebic range, I proceeded via Appleton, Wis., and to the end of the rails on the Milwaukee, Lake Shore & Western railroad, at the site of the present village of Watersmeet. From this point I walked over the right-of-way, transit-line, etc., to about the present site of Gogebic station, then over a trail to the camp of Peter Mitchell in Section 13, T. 46 N., R. 42 W., and from there by trail, boat across Gogebic lake, and trail to Sunday lake and the Montreal river.

I again visited the Gogebic range in 1885, going to the end of the rails, which was then about 3 miles southeast of the present village of Wakefield, and thence to the Montreal river, over the right-of-way of the Milwaukee, Lake Shore & Western, afterwards purchased by and now a part of the Chicago & Northwestern. At this time and during the two following years there was great activity and much exploring in the Gogebic district, between the center of Town 47-44, and a point several miles west of the Montreal river.

In the fall of 1885, the rails had reached a point 6 miles west of the Montreal river, and a trial cargo of ore was shipped from the Colby mine, being the first shipment of iron ore from the Gogebic range.

The railroad was finished to Ashland and ore shipments began in 1886, since which time the shipments of ore from the range have averaged about 3,000,000 tons per year, amply justifying the first estimates, as to the quantity of ore on the range, made by both Dr. Rominger and myself; he measured this quantity by his hat. I was more optimistic, and estimated it at 150,000 tons.

Mesabi Iron Range

Mesabi is an Indian word, meaning "Height of Land," and originally designated the granite range immediately north of the present Mesabi iron range. I had heard of iron in Minnesota from the time of my earliest acquaintance with the Lake Superior region, but the information was always qualified by the statement that there was so much titanium in the ore that it could not be worked, and was valueless. However, in 1885 or 1886, some allusions were made to the Mesabi iron district by Minnesota state and the United States geologists. In reading their reports the statement that the Mesabi formation was the equivalent of the Gogebic formation on the south shore of Lake Superior, attracted my attention, and I then took up the study of that region from such meager data as were available. In 1887, in company with some associates, I located 24,000 acres of land in one entry in the United States land office. The earliest reports indicated that the Mesabi formation was very flat, dipping only about four degrees to the south. I argued that if this formation was the equivalent of the Gogebic, that the merchantable ore should be on, or near, the footwall and that it would be possible to reach the footwall with a 1,000-foot shaft about three miles from the outcrop. The first map of the district published by the United States geological survey had on it a red line, indicating the junction of quartzite and granite as far as it had been determined. This purported to show the line of this junction from a point several miles east of the Duluth & Iron Range railroad, to and including the southeast side of what is now known as the "Horn." I therefore, selected all the government land subject to cash entry in a belt 3 miles wide, the entire length of this red line and lying south of it.

A Costly Mistake

I learned afterwards that the draftsman, in making his map had made a serious blunder, for he started the southwest "swing" of the formation 6 miles too far east. This threw the west end of my locations nearly 3 miles off the real course of the range. Thus occurred one of the narrow escapes I have had in achieving great things. However, mines enough were found on the property we purchased to justify the investment, but the results were insignificant compared with what they might have been had the draftsman in the United States geological survey office, placed the red line where it belonged.

Within a week after my entry of the 24,000 acres, at least 100,000 acres of land had been purchased at the United States land office.

A year or so after this purchase, I made an arrangement with Russell M. Bennett, of Minnesota, and we undertook an extensive exploration of Mesabi iron lands, for which we were to receive an interest in the properties, which were lands owned by lumber companies and which had been purchased for the pine timber on them. This exploration was quite successful, and later led to the development of several of the large mines of that district. My first personal visit to the Mesabi was in March, 1891; the trip being made in company with Mr Bennett and E. J. Longyear. We followed the tote-road from Mesabi station westerly along the iron range, to the exploring camp of Frank Hibbing in Section14, T. 58 N., R. 20 W., about 2 miles northeast of the present city of Chisholm, which was the end of the road. From there we went on snow shoes to our own camp on Section 35, T. 58 N., R. 21 W., about 2 miles northwest of the present city of Hibbing. From here we reached Grand Rapids and the railroad over a tote-road.

My first exploration on the Mesabi range was on some of the lands I had purchased in my 24,000-acre location, and was some of the first work of that kind done by E. J. Longyear, who subsequently explored a very large portion of the Mesabi range. He was equipped for this work with a diamond drill, having a rated capacity of 600 feet. The site we selected for the first hole was beside the Duluth & Iron Range railroad, a little more than 2 miles south from the footwall outcrop, this being the nearest land we had to the footwall. Here it would be easy to obtain fuel for the boiler, the timber of the country having been destroyed many years before by forest fires. A hole was bored at this point about 1,400 feet in depth without finding the footwall. After boring a hole 1,400 feet deep with a 600-foot drill, we abandoned this site, moving to another place looking for something easier.

French Need Tungsten

A recent report by the directors of the Vaulry et Cieux Mines, associated with the Societe Electro-Chimique du Giffre, indicates that French manufacturers are alive to the need for greater production of tungsten and molybdenum in the near future to meet the requirements of the high-speed industry. Previous to the war the United States, Great Britain and Germany ranked as the chief producers of such steel, but the present tendency is all against national specialization, and each steelmaking country is likely to turn out a much more comprehensive range of products than hitherto, if only from the point of view of trying to become industrially self-supporting. The report points out that radical changes are taking place in the manufacture of steel products, and that the use of tungsten steels is becoming wider every day, while fresh applications are continually being studied. Molybdenite, too, is likely to play an important part in the manufacture of certain special steels. The production of tool steels in France has now attained a position of importance which it will no doubt continue to hold after the war, and, although some fall in the price of wolfram and molybdenum ores is to be expected, it is tolerably certain that prices will not return to pre-war levels.

Tests on Soaking-Pit Crane Bits

Investigations in the Soaking-Pit Department of a Mid-West Steel Plant Show that Crane-Tong Bits of Chrome-Nickel Steel are More Economical Than Carbon Steel Bits

ONE of the foremost items of expense in steel plants is the maintenance charge. The cost of repairs to equipment parts which fail in service is always an important consideration, and many progressive companies are fully cognizant of this fact. On the other hand, only a few manufacturers of steel have taken definite steps to scientifically investigate the repair costs with a view of reducing them. Failures due to wearing out or to breakage are of common occurrence, and their replacement or repair is a continual source of annoyance, delay in operation, and expense.

Recently, a large steel company in the middle west decided to thoroughly investigate failures of equipment in its plant. The results of one of the tests, conducted to determine the life and cost of soaking-pit crane bits, clearly show that material savings in upkeep can be effected through scientific investigation. In soaking-pit practice, the ordinary crane tongs are equipped with small pointed bits as illustrated in Fig. 1, which grip the ingots when they are charged or drawn from the pits. The bits were made of 0.50 to 0.60 per cent carbon steel; and were forged to shape and size in a die under a light steam hammer but were not heat treated. Approximately 40 bits were being used every day of 24 hours by two cranes which served a 16-pit soaking department. Average figures for 2,000 bits made at the blacksmith shop showed that the bits cost $0.20 a piece. The cost was made up as follows:

Material cost	$44.73
Blacksmith labor	225.19
Overhead	134.97
Total cost of 2,000 bits	$404.89
Cost per bit	.20

The overhead expense may appear to be unreasonably excessive, but that item does not affect the comparison which will be drawn later. Assuming that 40 bits were used each day, the cost amounted to $8.

It was then decided to compare this cost with that of an alloy steel. A quantity of chrome-nickel steel scrap which had accumulated at the plant, was made up into tong-point forgings, which were heat treated. The metal contained 0.45 per cent carbon, 0.15 per cent silicon, 0.50 per cent manganese, less than 0.04 per cent phosphorous and sulphur, more than 0.30 per cent chromium, and 1.20 per cent nickel. The bits were forged in two different shapes, illustrated in Fig. 3. The preliminary tests showed that hardened bits were not satisfactory and that the alloy-steel bits had a much longer life than the bits made of straight carbon steel. One pair of chrome-nickel steel bits was in service for about 17 hours, during which time it was estimated that at least 300

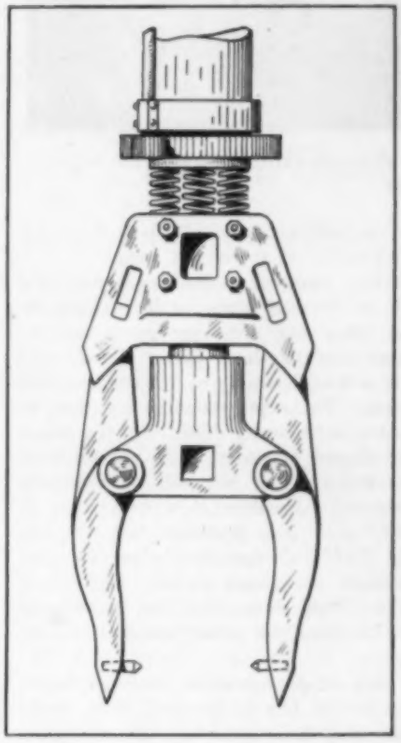


FIG. 1—CRANE TONGS SHOWING HOW BITS ARE INSERTED

ingots had been handled. In another trial, a set of square bits was in service for 24 hours and handled about 400 ingots.

Although individual runs for a given set of bits conveyed some idea of their life and probable service records, it was believed that more reliable data could be secured from an average run of a few days. Accordingly, 100 of the alloy bits were delivered to the pit floor with instructions that they be used according to the set of recommendations given in a later paragraph. It was found that 72 bits were used in 192 hours. The average number of ingots rolled in the blooming mill was 350 in 24 hours, which indicates that at least 700 lifts had been made by the cranes, since each ingot must be charged and drawn. In soaking-pit practice, ingots are often transferred from a comparatively cold pit to a hot one, and the cranes are also occupied periodically with handling dead cold ingots. A number of average counts showed that this work added about one fifth to the total number of lifts by the cranes in charging and drawing. Hence, approximately 840 ingots were handled in 24 hours. Seventy-two bits had lasted 192 hours which means that they had handled 6,720 ingots. From these figures it follows that $\frac{6,720}{36}$ or 187 ingots were handled per pair of bits.

Comparison of this figure with the similar figure for carbon steel bits shows the superiority of the alloy steel bit. Forty carbon-steel bits were used per 24 hours, equivalent to 320 bits in 192 hours. These figures show that $\frac{6,720}{160}$ or 42 ingots were handled per pair of bits. Comparison of the 42 ingots handled by the carbon steel bits with the 187 handled by the alloy bits, indicates a ratio of over 4 to 1 in favor of the latter.

Assuming that the chrome-nickel scrap cost the same as the carbon scrap, the daily cost of the two kinds of pits is as follows:

Cost of carbon steel bits = 40 x $0.20	$8.00
Cost of alloy steel bits = 9 x $0.20	1.80
Difference in cost per day	$6.20

The objection may be raised that the chrome-nickel steel if purchased new would cost more than new carbon steel. While this is true, the labor cost for making bits will average at least six times the material cost, so that the difference in cost of bits made of new material and bits made of scrap material will be small. For instance, figuring the cost of chrome-nickel steel bits if made from new billets, at $55 per ton, or about 2.5 times the cost of bits made from new carbon steel, the material cost would be about $0.12 per bit as against $0.04 per carbon steel bit. The cost of bits made from new material would then be:

Cost of carbon steel bits = 40 x $0.25	$10.00
Cost of alloy steel bits = 9 x 0.32	2.88
Difference cost per day	$7.12

Therefore the chrome-nickel steel bit, even if made of new material will be cheaper by far than the carbon-steel bit. Not only will there be a saving in cost

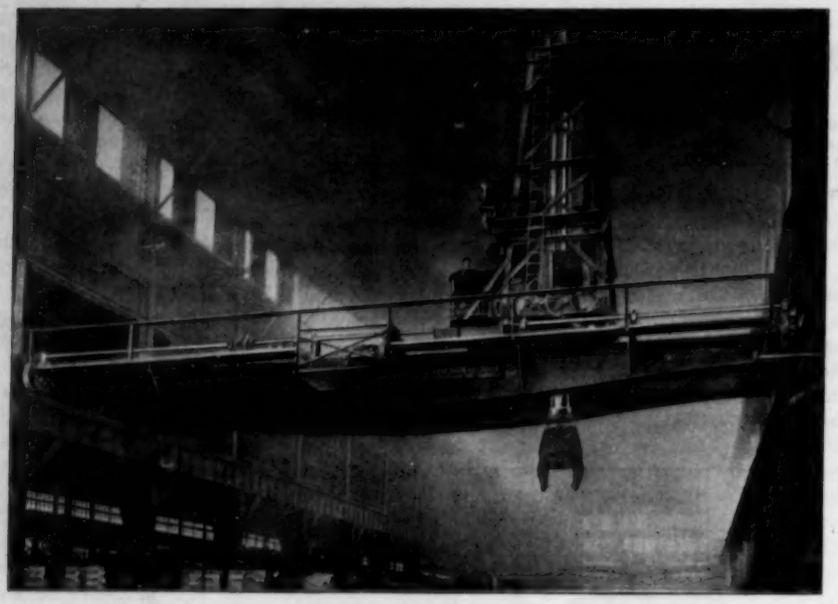


FIG. 2—ELECTRIC OVERHEAD-VERTICAL INGOT-CHARGING CRANE OF 10-TON CAPACITY

of bits, but also a considerable saving of time lost in charging bits—the latter affecting the blooming mill and following departments and consequently cutting down production.

Further investigation showed that it required an average of 1.5 minutes to make a change of bits, and inevitably a renewal had to be made when the crane was working at top speed. Assuming that 40 carbon-steel bits were used in 24 hours, the 20 changes that were made consumed 30 minutes of operating time during each day of 24 hours. From a similar deduction it is determined that 6.75 minutes in 24 hours were lost in changing chrome-nickel steel bits. Therefore the use of alloy steel bits effects a saving of 23.25 minutes every day, or 181 hours in a year of 312 working days.

Heat Treatment of Bits

In drawing and charging hot ingots, the bit points are brought practically to the ingot temperature, as can be readily seen by inspection. Since the steel of the bits is subject to a temperature considerably above its critical range, any heat treatment of bits would appear to be useless. Exposure of the bits to the ingot temperature will assuredly obliterate any pre-exiting structure. With this fact patent, it is apparent that the most satisfactory material for these bits would be a steel which would retain most of its strength and hardness at a red heat. The chrome-nickel steel, of the analysis given will do this to a degree. The steel is difficult to forge and is tough and comparatively hard at a red heat. This is to be expected, on account of the influence of both chromium and nickel on steel when present in sufficient amounts, both lowering the position of the critical range.

After charging a hot ingot into the pit or drawing one for deposition on the tilter car for conveyance to the usual first two-high universal mill, the bits will cool rapidly to a black heat and below. The crane tongs should then be cooled in a water bosh. If the tongs are dipped in water while the bit ends are still red, the bits will be materially hardened. Further, if a cold ingot is lifted with such hardened bits, the bits are liable to break and often do, particularly if a high carbon steel bit is used. This shows that bits should not be hardened by either accident or design.

Poor crane operation causes a larger number of bits to be used than would otherwise be necessary. At the plant under discussion, there were two cranes which served the soaking pits, and one crane used from two to four times as many bits as the other. This discrepancy was traceable to sloppy work on the part of the crane operator. The operator would draw a few hot ingots from the pit, and then, while the bits were still hot, would handle one or more cold ingots. This meant that the hot ends of the bits were heavily pressed upon the cold metal of the ingot; the bit end was turned over and flattened. The crane tongs should be cooled in the bosh after drawing or charging two hot ingots, and then only when the points have cooled in the air long enough so that the steel is not hardened by the quenching. A cold ingot should not be charged immediately after a hot one is drawn, unless the bits have been properly cooled.

Size of Bits

Crane-tong bits should be large enough to do the work required. Small bits, either as to diameter or length, or both, are useless, for as soon as the sharp points are turned over they become too short to pick up the ingot. The size and shape of bits recommended through the experiments made are shown in Fig. 3. The bit with the square point appeared better than the one with the round point, although positive data are lacking to verify the belief.

As has already been mentioned, bits were forged in a die under a light steam hammer. The die is subject to wear, and when made in a worn die, the bits will have a concave surface on the point. This is a source of weakness. The die should therefore be dressed at short intervals to keep it in good shape.

A bibliography of recent literature on the flotation of ores has been issued by the bureau of mines, Washington. The bibliography includes references to articles that appeared during the first six months of 1916 in metallurgical and mining journals.

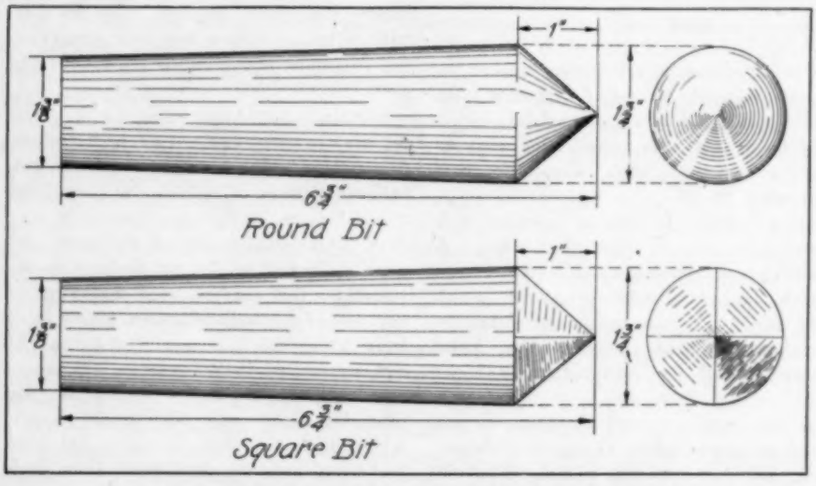


FIG. 3—TWO STYLES OF BITS USED IN THE TESTS

Electric Power on the Iron Ranges

Hydro-Electric Power Plants Augmented by Steam Plants are Supplying Many of the Mines with Continuous Service at a Reasonable Rate—Reliability and Economy are Features of Electrical Mine Operation

BY CHARLES HARGER

THREE large hydro-electric power developments on the Menominee range supply power almost exclusively to the iron mines in that district. Two of these systems are owned and operated by individual mining companies. The third is owned by the Peninsular Power Co., which sells its output to mines throughout the range. These power plants are on the Menominee river, which forms the state line between upper Michigan and Wisconsin.

The oldest of these three systems is owned by the Penn Iron Mining Co. and is located at Sturgeon Falls, the total output of the plant being used in and near Vulcan. The power station equipment consists of two water-wheel generators with a total capacity of 3,500 kilowatts. An auxiliary turbo-generator of 1,500-kilowatt capacity is used in times of low water and dam difficulties. The company's entire mining equipment is electrically driven at the present time. When the transfer from steam to electric power was made, the original machinery was converted to electric drive and considerable new equipment was added.

The 5,000-horsepower hydro-electric plant of the Oliver Iron Mining Co. at Quinnesic Falls was first operated in June, 1914. Extensive pumping equipment at the Chapin mine, about four miles from the falls, was installed at this time. The 13,200-volt transmission line from the power station to the mine is said to be one of the best constructed lines in this country.

Extensive Pumping Equipment at Chapin Mine

One of the largest installations of electrically driven centrifugal pumps in mine service in America is at the Chapin mine and is supplied with power from this plant. Two duplicate 3-stage pumps driven by 450-horsepower, 2,200-volt motors are placed on the sixteenth level. Each of these pumps is capable of handling 3,000 gallons per minute under a lift of 392 feet, which delivers the water to the twelfth level. On this level are two 6-stage pumps driven by 1,050-horsepower motors, having a capacity of 3,000 gallons under a head of 965 feet. The frequent starting and stopping of these motors imposes a severe strain on the power plant and a smaller pump of 900-gallon capacity was installed on each level to relieve this difficulty. The electric plant also carries a generator-motor set used for underground haulage and other equipment for the various lighting systems for the works. A 2,000-kilowatt steam turbo-generator supplements the hydro-electric equipment in case of accident.

Twenty-One Mines Served with Power

The electric development for the Peninsular Power Co. started in 1912 and was of a more or less temporary nature until the first installation at Twin Falls, consisting of three water-wheel units of 1,100-kilowatt capacity each was placed. The economy and flexibility of electrical operation caused the company to add additional units from time to time until equipment having a total capacity of 5,800 kilowatts was installed. With the exception of approximately 560 kilowatts, all of the power produced is taken by the mining industry. Power is now being supplied in various quantities to 13 mining interests of Iron River, Crystal Falls, Alpha and Florence, serving some 21 mines. Lines are now under construction to two other mines in this district.

As the present load is greater than the available power from the hydro plant in times of dry weather, the company has installed steam turbines at Iron River, having a capacity of 3,500 kilowatts. Plans are now in progress for the construction of a second water-power station. The present high-tension transmission consists of 40 miles of 66,000-volt lines. The lines are supported on steel towers set in concrete bases and are built in duplicate. Current is delivered to the mines from three high-tension substations at 6,600 volts. Low-tension substations at the mines step the voltage down to 2,200, at which pressure power is sold to the customers. Of the 21 mines supplied by this company, seven are operated entirely by electricity, steam being used only for heating the buildings. All compressors, pumps, hoists, crushers, blowers and haulage and shop machinery are actuated by electric motors. With the exception of the crushers and the compressors at the mines operated by the Florence company, all machines are direct-connected to the motors. The equipment at these mines, as well as at the 14 mines that are only partially electrified, which has been changed from steam to electric drive, consists in most cases of pumps and haulage machinery. In one case, that of the Bristol mine at Crystal Falls, only an air compressor is operated by electricity.

The power company's contracts with all mining companies are identical, varying only in the stipulation of the minimum charge, this being proportional to the amount of power guaranteed and upon the rated connected load. The rate per kilowatt hour is based upon the load factor of the load, ranging from 1.49 cents at a 20 per cent load factor to 0.9 cent at 90 per cent and above. The 1-cent rate covers a range of from 50 to 80 per cent load factor. The load factor is determined by the use of a maximum-demand meter registering 3-minute peaks and so connected that the hoisting load is not registered by the demand meter. With this arrangement a mine electrically equipped throughout with a small amount of care and attention in operation, may easily keep within the 1-cent rate. Where only the pumping is electric, the load being fairly constant and continuous, the low rate of nine mills may be attained.

Load Factor Determines Rate

The electrical operation of mining equipment, like many similar developments in other fields, requires considerable study and attention on the part of the superintendent in charge. When the power is purchased on a load-factor basis the load must be carefully regulated to produce the desirable high load factor. When power is used for pumping only the installation should be designed very carefully as the output of an electric pump may be varied only by by-passing the water or by starting and stopping the pumps. In the first case energy is wasted and in the second case the load factor is reduced

From a paper presented at the twenty-first annual meeting of the Lake Superior Mining Institute, Birmingham, Ala., March 13 to 16, 1917. The author, Charles Harger, is superintendent of the Peninsular Power Co.

if the pump is of too great capacity. Therefore, rather than install a pump of too large capacity it is more economical to install one that will barely take care of the water under normal conditions and have a smaller pump to use intermittently when the sump becomes full. Where a large sump is available and the amount of water is not too great, pumping may be done at off-peak periods.

In the case of a new mine where water conditions are not yet fully developed, the following plan is successfully used by the Verona company: A reciprocating pump is installed of larger capacity than the present water demands. The cylinders are bushed and smaller pistons inserted. As the mine develops and the water increases, the cylinders are made larger by changing the size of the bushings and plungers or perhaps removing the bushings entirely and using the pump at full capacity. At present there is being developed a pump so designed that the length of stroke may be quickly and easily changed to meet the above conditions. Also, without doubt, there will shortly appear on the market a motor-driven pump with a gear-changing arrangement similar to that of an automobile, by which the speed of the pump may be changed without changing the motor speed. When this is done, the electric pump will be as flexible as the old steam pump.

As all compressors connected to this system are driven by synchronous motors, almost ideal voltage regulation is possible. All compressors may be blocked at ¼, ½, ¾, or full load. This arrangement is also taken advantage of by the wide-awake superintendent or engineer in holding the load as nearly continuous as possible.

In the matter of load regulation, a graphic or curve-drawing wattmeter should be a part of the switchboard equipment in the power house of each mine. Thus the man in charge will have a complete record of the load each day, which will very materially help him in arranging his operation so as to keep down the peaks and level the curve. The meter is also a check on the power company's demand meter. The meter should have a chart travel of four inches to the hour. Equally desirable is a watt-hour meter connected to each circuit feeding the several machines so that the cost of operating each unit can be computed and distributed. The total of the several meters is a fair check upon the main watt-hour meter of the furnishing company.

In any construction work the thought of curtailing first cost generally predominates. In the electrification of mining equipment, this idea should not be carried to an extreme which does not leave the installation thorough in construction, secured against interruption, ample in capacity, and, above all, safe, simple, and convenient in operation. The engine house, containing the hoists, compressor, motor-generator and switchboard, should be given thoughtful consideration in the arrangement. The floor space taken by electrically driven machinery is less than 50 per cent of that required for steam equipment of the same capacity; but the equipment should not be too crowded.

The underground construction is of prime importance. As the operation of a mine is primarily dependent upon the pumping equipment, this part of the installation should be carefully planned. A large room for the pumps should be provided, and, as moisture is the worst enemy of an electric motor, the room should be made as dry as possible. With but few exceptions, all underground pump motors on this range are of 2,200 volts. Operators were at first apprehensive about using current of this pressure underground, but it is now almost universal practice. With the modern methods of conducting the current into the mines, the danger of injury from contact with the conductor is removed. The most approved method is to use a 3-wire, varnished, cambric or rubber-insulated, lead-covered, jute-wrapped, steel-armored cable. A special form of hanger is used which securely clamps the steel armor without injury, so that when the cable is in the shaft its weight is carried by the armor. If this cable is taken from the bus at the switchboard through the shaft into the pump station with no taps or other openings in its insulation throughout its entire length there is no danger in rupturing the cable and the risk to workmen is eliminated. The continuity of service is also safeguarded.

Below are given data on the cost of current in electric pumping at several mines of the range. The rate in all cases was 1 cent per kilowatt hour, as computed from information supplied by the consumer. The figures are taken from actual operations of five different mines covering periods from 24 hours to 30 days.

Head in ft.	Gal. per min.	Type of pump.	Cost per million ft. gal.
470	840	Centrifugal	5.12c
368	315	Reciprocating	4.52c
280	168	Reciprocating	4.62c
508	1,140	Reciprocating	4.19c
490	168	Reciprocating	4.43c

Experience shows that hoisting by electric motors is ideal. There are seven electric hoists in the range which are hoisting ore at an average of 1.4 cents per thousand foot-tons. The economy, practicability, convenience and adaptability of electricity in mines has been proved beyond the shadow of a doubt by the mining industry of northern Michigan.

Norway Tin Plate Market

The American consular agent in Trondhjem reports a considerable shortage of tin plate throughout northern Norway, and consequently manufacturers of canned goods are experiencing some difficulty in obtaining sufficient supplies to keep their factories running. Previous to the war tin plate was obtained from England, but shipments from this source now come only in small quantities. A good opportunity, therefore, exists for the introduction of American tin plate. There are 15 to 20 canning factories in the Trondhjem district alone. These factories obtain their tin plate through Trondhjem import agents.

Most of the tin used comes in plates of 20 x 28 inches, packed 112 plates to the case. The Trondhjem Canners' Import Union has made arrangements with the British authorities by which goods of this description may be imported if consigned to the union and not to individual members. After selecting an agent, shipments should be made to this union, and the agent notified. The best way to introduce the goods would be to send a sample case to the agent, in order that he may be able to show the goods to his customers when soliciting orders. Shipments should be made by the Norwegian American line and quotations given c. i. f. Norwegian port, if possible. The usual terms of payment are cash against documents in Norway, but if required arrangements could be made to open credit in New York for payment against documents at shipping port.

According to a report issued by the United States vice consul at Frankfort-on-Main, the first substitute for a cycle rubber tire to appear in Germany was a tire made of steel wire about 3/16 inch thick, wound into a very close coil, the two ends being welded together to give it the proper shape. These tires are sold at $2.85 wholesale and retail at $4.28. Wire is said to be a poor substitute as it cuts into the pavement and rattles considerably. Wood and rope tires have also been used with varying degrees of success.

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

First Aid Instruction

In an article by M. W. Alexander in a recent issue, reference is made to "Instructions to Laymen for First Aid Treatment of Minor Injuries and Disorders", published by the Conference Board of Physicians in Industrial Practice. Can you tell us where we can obtain a copy of these instructions?

Copies may be obtained by addressing M. W. Alexander, secretary, National Affiliated Safety Organizations, care General Electric Co., West Lynn, Mass.

Uses of Hydrogen

What is hydrogen gas used for in the industries other than for hydrogenating oils, lead burning and cutting metals?

Hydrogen gas is used in the oxy-hydrogen blowpipe for the fusion and welding of platinum, iron, lead, copper, etc. The gas is also used in steel works for the autogeneous welding of iron to iron and for homogeneously filling up with a perfect joint, the blow holes which are often found in molten steel castings. Autogeneous welding employing hydrogen has been applied in boiler factories.

For heating the baking and annealing kilns for ceramic materials, hydrogen and water gas have been used. Many chemical operations can be carried out by means of the oxy-hydrogen flame instead of the electric furnace. In glass works, the heating of furnaces and crucibles is greatly accelerated by means of the oxy-hydrogen flame. The so-called lime-light is produced by impinging an oxy-hydrogen flame onto a block of quick-lime. During recent years, hydrogen has assumed great importance in aeronautics, being used for gas and dirigible balloons. Hydrogen is also used indirectly for illumination with the Auer mantle (formed of thorium and zinconium oxides). Hydrogen has also been proposed as a motive force for driving gas motors. This use has not been developed commercially.

Specifications for Rails

What is the range in weight of rail sections as specified by the American Society for Testing Materials? What is the range in weight of rail sections as specified by the American Railway Association?

The standard specifications for steel rails as adopted by the American Society for Testing Materials and by the American Railway Association are given in the table at the bottom of the page.

Strength of Shafts

Do twisted crank shafts have the same strength as the ones that are forged straight?

Large crank shafts with multiple cranks set at 60 or 90 degrees apart are forged with the cranks in the same plane. Then the shaft between the cranks is brought to a high forging heat, and the arms are twisted through the angle necessary to locate the pair of cranks in their proper relation to each other. A second section is then treated in the same

Specifications for Steel Rails

(Adopted by American Society for Testing Materials.)

BESSEMER STEEL.

Elements.	—Weights in pounds per yard— 50–69 inc., per cent.	70–80 inc., per cent.	81–100 inc., per cent.	101–120 inc., per cent.
Carbon	0.37–0.47	0.40–0.50	0.45–0.55	0.45–0.55
Manganese	0.80–1.10	0.80–1.10	0.80–1.10	0.80–1.10
Phosphorus, maximum.	0.10	0.10	0.10	0.10
Silicon, maximum	0.20	0.20	0.20	0.20

OPEN HEARTH STEEL.

Carbon	0.50–0.63	0.53–0.66	0.62–0.75	0.62–0.75
Manganese	0.60–0.90	0.60–0.90	0.60–0.90	0.60–0.90
Phosphorus, maximum.	0.04	0.04	0.04	0.04
Silicon, maximum	0.20	0.20	0.20	0.20

*When lower phosphorus can be secured, a proportionate increase in carbon should be made.

(Adopted by American Railway Association)

BESSEMER STEEL.

Elements.	—Weights in pounds per yard— 60, per cent.	70, per cent.	80, per cent.	90, per cent.	100, per cent.
Carbon	0.37–0.47	0.40–0.50	0.43–0.53	0.45–0.55	0.46–0.56
Manganese	0.80–1.10	0.80–1.10	0.80–1.10	0.80–1.10	0.80–1.10
Silicon	0.10–0.20	0.10–0.20	0.10–0.20	0.10–0.20	0.10–0.20
Phos., not to exceed*	0.10	0.10	0.10	0.10	0.10
Sulphur, not to exceed.	0.075	0.075	0.075	0.075	0.075

OPEN HEARTH STEEL

Carbon	0.50–0.60	0.55–0.65	0.60–0.70	0.65–0.75	0.70–0.80
Manganese	0.75–1.00	0.75–1.00	0.75–1.00	0.75–1.00	0.75–1.00
Silicon	0.10–0.20	0.10–0.20	0.10–0.20	0.10–0.20	0.10–0.20
Phos., not to exceed†	0.04	0.04	0.04	0.04	0.04
Sulphur, not to exceed.	0.06	0.06	0.06	0.06	0.06

†When higher phosphorus is used, a proportionate reduction in carbon should be made.

manner. It is claimed by the makers of twisted shaft that the strength of such shafts is not impaired by the twisting, and that the strength is equal to, if not greater, than the strength of shafts forged straight. This method is used by the leading makers of crank shafts, and purchasers need have no fear regarding the quality of shafts forged in this way. Some multiple crank shafts are machined from a cylindrical forging, which may be necessary where the cranks are very close together. This method does not necessarily insure any greater strength.

Analysis of Limestone

Will you kindly furnish us with the analysis of a good limestone to be used as a cupola flux in gray iron foundries. What is the maximum permissible content of magnesium carbonate, silicon, phosphorus, iron, aluminum and sulphur and what is the minimum permissible content of calcium carbonate? In other words, would the presence of 10 *per cent magnesium carbonate,* 0.40 *per cent silicon or* 0.004 *per cent phosphorus be objectionable?*

It is exceedingly difficult to obtain a limestone containing less than 10 per cent magnesium carbonate. If it was all lime it would be preferable. It is quite common to have stone containing 40 per cent of magnesia, when it becomes a dolomite and is of no use for this purpose. Such a small percentage of silicon will do no harm and the percentage of phosphorus will prove beneficial rather than detrimental. The carbonate of lime should be 86 per cent. The danger is in the content of iron pyrites, which appear in dark patches and in this form it all enters the iron.

Analysis of limestone from Marblehead, O.: Calcium carbonate, 83.20 per cent; magnesium carbonate, 15.83 per cent; silica, 0.15 per cent; organic matter, 0.02 per cent and moisture, 0.80 per cent.

Kelly Island limestone: Calcium carbonate, 87.50 per cent; magnesium carbonate, 9.75 per cent; silica, 1.81 per cent; alumina, 0.75 per cent; phosphorus, 0.01 per cent, and magnesia by difference, 0.17 per cent.

Sibley, Mich., limestone: Calcium carbonate, 98.48 per cent; magnesium carbonate, 0.15 per cent; silica, 0.17 per cent and moisture, 1.20 per cent.

Another limestone sample from Sibley, Mich.: Calcium carbonate, 86 per cent; magnesium carbonate, 9 per cent; silica, 3 per cent, and iron, 2 per cent.

Making Cement Balls

Kindly let us know what kind of material is used to make cement balls and how they are manufactured.

The balls used in cement mills for grinding clinker to a fine powder are made of chrome steel containing from 1 to 2 per cent of chrome and 1 per cent or less of carbon. They are made in various sizes up to 12 inches in diameter. The chrome steel is first cast in ingots from the crucibles, the ingots having the volume required for the balls. The ingots are furnace-heated to 1,550 degrees Fahr. and forged in dies by skilled workmen to a spherical form. The hammer scale is removed during the forging by throwing on a little powdered bituminous coal, or by a moist air blast or a steam jet. The forged balls are then heat-treated to give them the tough-hardness required. This consists of heating the steel above its transformation range, 1,400 to 1,600 degrees Fahr., and quenching in oil. The metal is then reheated to about 1,000 degrees Fahr. and quenched again.

Permanent Records of Laboratory Tests

THE rapid development of high-speed machinery within the last decade has created an almost universal demand for materials of light weight and extraordinary strength. This development has made the commercial testing laboratory an essential part of all up-to-date plants. For example, the modern aeroplane, singularly wasp-like in appearance, is the paragon of the knowledge and work of the industrial laboratory. Although the importance of science and research is generally appreciated by progressive manufacturers, in many cases, the routine of the laboratory has been handicapped, and the full value of the resources of this department in many cases has not been realized due to a lack of comprehensive systems of record-keeping.

An insight into the use of steel in aeroplanes was given in the Jan. 4 issue of *The Iron Trade Review*. This article told briefly how the testing laboratories at the plant of the Curtiss Aeroplane Co. in Buffalo, N. Y., played an important role in the production of heavier-than-air machines. All of the raw materials that enter into the construction of these machines are tested in the chemical and physical laboratories which occupy a large portion of one of the newer buildings. Before any purchases are made, tests are conducted to assure the company that the quality of the supplies meets the specifications. In addition to this function, the testing department has the important office of ascertaining the proper treatment of

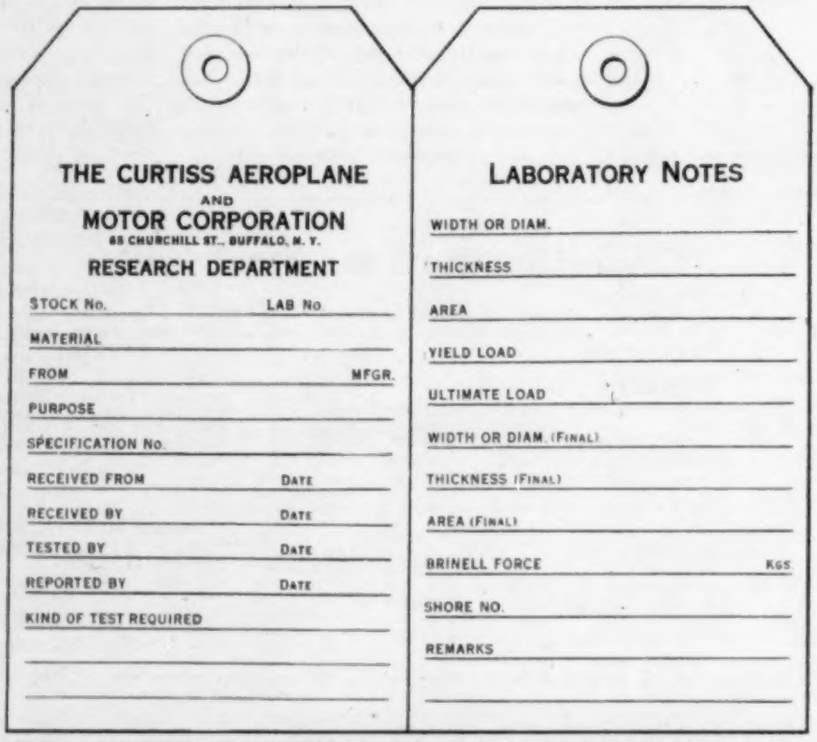


FIG. 1—TAG USED TO IDENTIFY TEST PIECES IN PHYSICAL LABORATORY

DESCRIPTION	SERIAL NO.	LAB. NO.	Density	DIMENSIONS OF TEST PIECE			YIELD POINT		ULTIMATE TENSILE STRENGTH			Per Cent yield to elongation	Elongation Per Cent	REDUCTION OF AREA		HARDNESS		REMARKS
				Length between center punch marks Inches	Width or Diameter Inches	Thick Inches	Area Sq. In.	Load Pounds	Pounds per Sq. In.	Max. load Pounds	Pounds per Sq. In.	Tons per Sq. In.			Width or Diameter Inches	Area Sq. In.	Reduction Per cent	Brinnell test No.	Shore test No.	

FIG. 2—DATA SHEET USED BY THE PHYSICAL TEST DEPARTMENT—THE CONCISE INFORMATION ENTERED ON THESE SHEETS TELLS THE HISTORY OF THE TEST

stock while it is being prepared for assembly.

Secondary in importance only to the actual testing itself is the necessity of keeping clear, concise and permanent records of all the tests made, both physical and chemical. An immediate report, of course, is sufficient evidence in most cases to warrant the acceptance or rejection of supplies. It is essential, however, that a record be maintained of the results of the tests but it also is important that part of the original test sample be filed for a reasonable length of time in order that the work of the laboratory may be checked in case there is dissatisfaction with the materials after they have been placed and tested in service.

How the Records are Kept

Half of the original test sample is filed in an envelope similar to the one shown in Fig. 3. The results of the analysis of the half used for testing are recorded on the side of the carton shown in this illustration; the reverse side of the envelope is printed with a legend similar to the one side of the tag at the left in Fig. 1. Such a simple expedient serves not only to establish a record of the test which has been conducted, but it also preserves half of the original sample with these results so that provision is made for a check on the work of the research department. Work which is to be tested in the physical testing laboratory is identified by a tag such as the one shown in Fig. 1. This tag, when filled out, is a complete log of the piece from the time it enters the testing department until the test is completed and the piece is laid away

CURTISS AEROPLANE & MOTOR CORP
BUFFALO, N Y.

RESEARCH DEPARTMENT

ANALYZE FOR ELEMENTS CHECKED:

C. C.		Ni		Fe	
G. C.		Co		Pb	
T. C.		V		Al	
Si		W		Sb	
Mn		Cu		Mg	
S		Sn			
P		Zn			

SAMPLES SHOULD BE ABSOLUTELY FREE FROM FOREIGN MATERIAL.

ONE OUNCE OF VERY FINE DRILLINGS OR TURNINGS IS SUFFICIENT FOR A COMPLETE ANALYSIS OF ANY METAL.

FIG. 3—ON THE SIDE OF THE ENVELOPE USED TO PRESERVE PART OF THE TEST SAMPLE IS RECORDED THE RESULT OF THE CHEMICAL ANALYSIS

on a storage shelf where it is kept for about six months. Enough surplus stock is provided to allow a repetition of the test. The purpose of retaining the test piece from the physical laboratory is the same as that for keeping material to check the work of the chemical laboratory. The general type of data sheets used by the physical and chemical laboratories is shown in Figs. 2 and 4, respectively. These sheets are 8½ x 13 inches. After the tests are completed the sheets are filed as permanent records of the research department.

Mining and Treating Molybdenum

C. C. Mackenzie, of the department of mines, Ottawa, Ont., recently delivered a lecture before the Royal Canadian Institute on the subject, "Mining and Metallurgical Treatment of Molybdenum." Mr. Mackenzie related the development of what is probably Canada's newest mining branch and asserted that during the current year Canada will produce more of the mineral, which is of great value as a steel hardener in the manufacture of munitions, than Australia and Norway together. These two countries were heretofore the chief miners of molybdenum. Previous to the outbreak of the war Canada purchased numerous minerals in small quantities from foreign countries but when hostilities closed the source of supply the country faced the problem of seeking these materials, particularly molybdenum, within its own boundaries. Deposits of the ore were uncovered in various parts of Canada including British Columbia, Ontario and Quebec. An urgent demand from

CURTISS AEROPLANE AND MOTOR CORPORATION
BUFFALO, N. Y.
RESEARCH DEPARTMENT

DATE
REPORT NO.
COPY TO

CHEMICAL TEST OF MODEL
FROM

SUBMITTED BY
ANALYZED BY
REPORTED BY

DESCRIPTION	SERIAL NUMBER	CHEM. AND PHYS. LAB. NUMBER	C. C.	G. C.	T. C.	Si	Mn	S	P	Ni	Cr	V	W	Cu	Sn	Zn	Fe	Pb	Al	Sb	Mg		

FIG. 4—CHEMICAL ANALYSIS DATA SHEET—THE FUNCTION OF THIS SHEET IS SIMILAR TO THAT OF THE PHYSICAL TEST DATA SHEET

the imperial munitions board for the mineral caused an agreement to be reached between the Canadian government and the imperial munitions board, whereby the department of mines would act as purchasing agent for molybdenum.

A machine was devised in which the ore in a finely crushed condition is shaken down from a hopper on a rapidly moving stream of water. The molybdenum proper resists wetting, and so floats on the surface of the water while other materials sink to the bottom. With certain elaborations, such as combing the water by fine water jets, this machine was found to be highly satisfactory. The International Molybdenum Co., of Orillia, Ont., was the first concern in Canada to go into the molybdenum business. It is the intention of this company to build an addition to its plant in order that it may convert scrap into pig iron. Molybdenum has like other minerals increased in price nearly 200 per cent since the war started.

Care of Reduction Gears for Mine Pumps

BY FRED M. PRESCOTT

THE fundamental and conspicuous advantages of the double helical gear are its greatly increased mechanical efficiency and the high ratios of reduction permissible between gear and pinion. These advantages are of great value to users of geared pumps because they simplify construction and lengthen the life and increase the efficiency of the entire installation.

It must be remembered, however, that to secure these values, gears of this kind must be cut with a fine precision and accuracy. Only the most delicately adjusted machines can be used, coupled with workmanship of the highest order, producing a degree of mechanical exactness through the whole process that is seldom fully appreciated even by those who buy the gears. It follows then that the greatest care and attention must also be given to installing such gearing and this work should be entrusted only to an experienced and skilled mechanic. Experience has shown that nearly all gear troubles have been caused by faulty alignment at the time of erecting and starting the machines. A word of caution, amounting to almost a warning, cannot be sounded too loudly on this phase of the subject, so vital is it to the welfare, life and efficiency of any geared pumping unit.

Because the pumps have been erected, and the gears leveled, properly lined up and adjusted in the shop, it does not follow that after the installation has been knocked down, shipped and re-erected on some other foundation, everything will go together again accurately. Great care must again be taken to check every level and alignment and to be sure of the following points:

1. That the pump is erected on a firm and solid foundation.

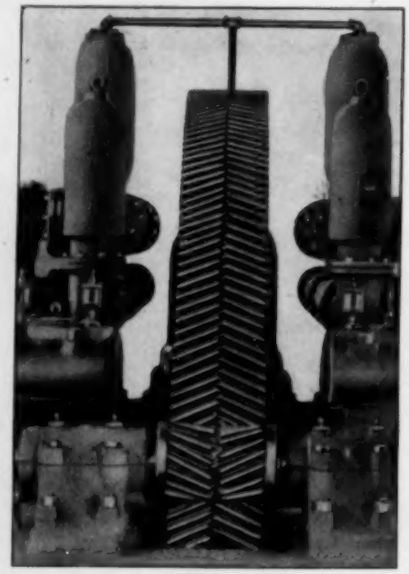
2. That the frames are set absolutely level, the proper distance apart and parallel.

3. That the levels of the frames are maintained after they and other parts of the pump have been grouted in and the foundation bolts pulled tight. (This is to be sure that the frames are set without any undue strains.)

4. That the gear shaft is absolutely level.

5. That the pinion shaft is level.

6. That the gear shaft and pinion shaft are absolutely parallel.



TYPICAL MINE PUMP INSTALLATION SHOWING HERRINGBONE REDUCTION GEARS

7. That the gear and pinion teeth mesh with approximately 0.015 clearance or back lash.

8. That there are no dirt and chips between the gear hub and the shaft, and that the joints and hub are clean, and that all of the bolts are brought up tight.

9. That the hub has a good bearing on the shaft all around and that it does not ride on the top of the key when tightened.

10. That the pinion shaft has a good bearing the entire length of its boxes—a dummy shaft should be used to ascertain this, and the bearing scraped to the required exactness.

11. That the motor shaft is in exact line with the pinion shaft.

12. That the halves of the flexible coupling are set sufficiently apart to allow for the customary end motion.

13. That the flexible parts in the coupling have ample freedom to allow for extensibility as well as flexibility.

14. That the gears are never without lubrication.

15. That the main bearings are pulled up fairly snug in order to eliminate any side motion.

16. That shims be placed back of the pillow block quarter boxes to keep the gears at their original centers in case the main bearings ever become excessively worn.

Above all it must be impressed on the mechanic that straightedges, levels and other tools of approximate correctness will not do, for with gearing whose teeth are generated to register perfectly, the settings must be exact to the thousandth part of an inch. If so maintained, gears of this kind will last a long time; but if any of these details are neglected at the outset, trouble may be expected later.

Herringbone gears must be lubricated freely and constantly. With slow running gears doing heavy work, as in mine pumps, the lubricant should be heavy, viscous and above all things, free from grit. When first starting up the gears, after cleaning them thoroughly, it is always a good policy to slush the teeth freely with white lead, and then run them in that condition under full load long enough to insure against seizing. This precaution protects them from the common danger of biting or cutting when picking up their initial load, which, once it has happened, is a sure forerunner of serious wear. After the application of white lead the gears must again be thoroughly cleaned and dried before the regular lubricant is used.

In all cases where possible, geared pumps should be erected under the supervision of a man sent from the factory. If, however, this is not feasible and due regard is given to the essential accuracies pointed out in this article, the pump should run smoothly, efficiently and quietly.

From a paper presented at the twenty-first annual meeting of the Lake Superior Mining Institute, Birmingham, Ala., March 13 to 16, 1917. The author, Fred M. Prescott, is president of the Prescott Co., Menominee, Mich.

Canada's Future

Problems of Iron and Steel Industry Discussed at Institute Meeting

The nineteenth annual convention of the Canadian Mining Institute held at Montreal March 7, 8 and 9 was of special interest on account of the attention devoted to metallurgical problems arising from war conditions. In his annual address, President Arthur A. Cole, of Cobalt, said that the abnormally high prices of metals had greatly stimulated the mining industry and the year 1916 had established a new high record. Reviewing the work of the institute he stated that it has been influential in securing a guarantee of an ample supply of cyanide for the mining industry and that its recommendation to the government for the appointment of a commission to correlate information respecting the resources of industry had led to the creation of the advisory council for scientific and industrial research.

E. P. Mathewson, of Toronto, in an address on industrial preparedness strongly urged the need of having proper statistics regarding industries, stating that the present statistical reports were based on insufficient data. The government should be asked to appoint a special statistical board composed of employes of the various departments concerned with production and commerce to compile the necessary data regarding all industries.

"The Future of the Iron and Steel Industry in Canada," was the subject of two papers of special interest in view of the changed conditions anticipated at the close of the war. D. H. McDougall said that the present position was one of artificial stimulation owing to war demands. When conditions were reversed the factors of permanent success would be location in proximity to the supply of coal and raw material and the nearness of markets for the output. He expected that many small businesses now profitable would not be able to maintain their ground.

Corbett F. Whitton presented a paper dealing exhaustively with the position of the iron and steel trade with elaborate statistics of the production and cost, as compared with the trade in the United States. He contended that the American steel manufacturers had an enormous advantage over those of Canada in the lower cost of production. In the discussion which followed some exception was taken with regard to the accuracy of his figures. G. A. Irving, of the Algoma Steel Co., said that manufacturers must have a more diversified output. The Algoma Steel Co. is now installing a mill for the production of structural shapes. Several speakers called attention to tariff anomalies and expressed themselves in favor of a more uniform tariff. Dr. Porter, of Montreal, said that the Canadian iron ore industry would have progressed much more rapidly but for the importation of the iron ores of the United States.

John McLeish, chief of the division of mineral resources and statistics, presented the preliminary report of the mineral production of Canada for 1916 which showed the total value to be $177,357,454 as compared with $137,109,171 in 1915. The total metallic production was $107,040,035. The production of pig iron was 1,169,257 tons valued at $16,750,903, an increase in quantity of 27.9 per cent over 1915. The production of ferro-alloys in electric furnaces was 28,628 tons valued at $1,777,615. The estimated production of steel ingots and castings was 1,454,124 tons, an increase over 1915 of 42 per cent. Iron ore shipments showed a falling off being 339,000 tons valued at $814,044, as compared with 398,112 tons valued at $774,427 in 1915. Iron mining operations were confined to the Helen and Magpie mines of the Algoma Steel Corporation. Shipments of iron ore from the Wabana mines, Newfoundland, amounted to 1,012,060 tons.

The annual banquet of the institute was held at the Ritz-Carlton hotel on the evening of the 8th. A specially interesting feature was the presentation to E. P. Mathewson of the gold medal awarded for distinguished services by the Mining and Metallurgical Institute of America, a delegation from that society being among the guests. The presentation was made by W. R. Ingalls of New York.

Will Operate Hamilton Furnace

The name of the new company recently formed to take over the blast furnace of the Miami Iron & Steel Co., Hamilton, O., will be the Hamilton Iron Co., and it will have a capitalization of $1,000,000. Articles of incorporation will be taken out in about 10 days. The Hamilton Iron Co. is composed principally of John A. Savage, of John A. Savage & Co., Duluth, Minn.; H. W. Croft, of the Harbison-Walker Refractories Co., Pittsburgh; T. L. Chadbourne Jr., of New York; Harvey H. Brown, of the Stewart Iron Co., Cleveland, and L. S. Turley, of Portsmouth, O.

The blast furnace of the Miami Iron & Steel Co. was built in 1907-1908, and has a capacity of 400 tons a day. The iron produced has been known as Miami iron. The furnace has been idle since 1913, but was relined less than a year ago, and is in good condition. Operations by the new company will be begun about May 1.

English Market Firm

Traffic Conditions and Labor Shortage Hamper Production in Steel Plants

Bureau of *The Iron Trade Review*,
Prince's Chambers, Corporation St.,
Birmingham, Eng., March 7, 1917.

The demand for foundry pig iron continues to be exceptional and in excess of the capacity of the smelters. Contracts usually are proportioned on the basis of the capacities of the furnaces. The general firmness in all branches of the pig iron market maintains prices at high levels. In the northern part of England, where smelters are less dependent upon inland canals, furnaces have been started and iron is slightly more plentiful. The control committee has been able to slightly increase the supply to consumers and in general to satisfy their demands. March allotments of foundry iron to Scottish and Midland consumers, it is hoped, will be on a larger scale than that of the past few months. Considerable demand exists from allied consumers as well as from the home markets.

Deliveries have been somewhat restricted by scarcity of conveyances, but shipments are improving and export licenses are being granted somewhat more readily. Shipments now total about 1,500 tons from the first of the month and warrant stock has been reduced to 300 tons. At present, only a small amount of Swedish ore is being transported, but the stock here is such that there is no serious danger of immediate shortage.

Coal deliveries to the Midlands have been slightly hampered by the frozen canals and some of the furnaces have had to be banked, while others have had to reduce their output. Smelters have now abandoned their hopes for higher selling prices and there seems reason to believe that selling figures have now reached the maximum. The government is still using large quantities of high class foundry iron. Steelmakers, however, feel the need of more hematite.

The labor situation has not materially improved, and, if anything, is suffering more than ever from the withdrawal of men from the industries by the government. Although the war office plans to supply substitutes and is doing this after a fashion, the lack of skilled workmen still prevails. This is particularly true in the Sheffield district, where producers are dissatisfied with the unsatisfactory substitutes. Objections from the laborers indicate a feeling of injustice on the part of the government for sending slightly built men experienced only in office work to handle the heavy masses of hot steel.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

OLIVER J. ABELL, has resigned as western editor of *The Iron Age* to engage in business for himself as a manufacturer's agent, with offices in the Sharples building, 565 Washington boulevard, Chicago. Mr. Abell will specialize on equipment for handling materials and the transmission of power, including a full line of chain for elevating, conveying and power-drive purposes. Other apparatus for handling materials in industrial plants, such as shop trucks, hoists and cranes, will be carried. Exclusive representation has been secured from the Howe Chain Co., Union Chain & Mfg. Co. and E. R. Senn & Co. Other connections with manufacturers are being negotiated.

Mr. Abell is a graduate of the Case School of Applied Science, Cleveland, and has had extensive experience in trade journalism and in the iron and steel business. For a time he was mining editor of *The Iron Trade Review*, with offices in Duluth, later becoming associate editor of *The Iron Trade Review* in charge of the Chicago office. He resigned from his position in 1909 to engage in the manufacture of mining equipment. For the past five years he has been western editor of *The Iron Age*, with headquarters in Chicago. He is a member of the Chicago Foundrymen's club, American Foundrymen's Association and of the Engineers' and University clubs of Chicago.

George Evans, former electrical engineer with the Valley Mold & Iron Co., Sharpsville, Pa., now is superintendent of the Penn Mold & Mfg. Co., Canal Dover, O.

Le Roy Ferry, of Ferry y Giol, metal fabricators of Barcelona, Spain, has arrived in this country to make important purchases of railroad and ship steel, railroad equipment and other supplies.

Charles C. Ross, formerly connected with George A. McLean & Co., Pittsburgh, now is engaged in the scrap iron and steel business, with offices at 518 Farmers' Bank building, Pittsburgh.

J. P. Barr, engineer, National Fireproofing Co., Cleveland, talked about "Fireproofing and Fireproofing Methods", March 6, before the structural section of the Engineers' Society of Western Pennsylvania.

George P. Bangs, formerly superintendent of the casting shop of the National Brass & Copper Co., Hastings-on-Hudson, N. Y., has been made metallurgist for the Wheeler Condenser Co., Cartaret, N. J.

James F. Paige, recently of the Fore River Ship Building Co., of Quincy, Mass., has been appointed general manager of the Western Dry Dock & Ship Building Co., of Port Arthur, Ont.

Warren H. Pike, Worcester, Mass., who has been with the Fort Pitt Bridge Works, Canonsburg, Pa., for the past year, has resigned and sailed from New York for Havana, Cuba, where he has accepted a position with the American Steel Co., a bridge fabricator.

OLIVER J. ABELL

Charles Wilson, a veteran athletic coach, who has served a number of colleges, has been retained as director of athletic sports for employes of the Joliet plant of the Illinois Steel Co. His career includes service with Illinois, Purdue, Princeton, Wisconsin and the Illinois Athletic Club.

J. A. Merkt, who has been district engineer of the American Steel & Wire Co., Worcester, has been made chief engineer of the American Tube Stamping Co., Bridgeport, Conn. J. F. Savage has been made general manager of sales of the same company. He formerly had been connected with the New York office.

Lawrence H. Stone has been promoted to the office of superintendent of the Thomas Iron Co.'s Richard mine to succeed Albert L. Lobb. Mr. Lobb was connected with the iron company for 32 years. He started as a miner and advanced slowly until he was made assistant to the superintendent, James Arthur, in 1910.

James A. Campbell, president of the Youngstown Sheet & Tube Co., Youngstown, O., is spending March in Hot Springs, Ark. Mr. Campbell takes his annual vacation during the spring training period for the baseball teams and usually goes to Hot Springs, where for years the Pittsburgh Nationals have trained.

H. M. F. Tuckwell, purchasing agent of the Tata Iron & Steel Co., Sakchi, India, is in New York, with headquarters at the offices of Chas. P. Perin, 2 Rector street, and will cooperate with the latter in the purchase of a large amount of steel works equipment for which the Tata company now is in the market.

John F. Keller, instructor in forging and heat treatment of metals, Purdue University, read a paper before the monthly meeting of the Steel Treating Research Club, Detroit, March 7, on the subject of "Steel, Its Selection and Treatment, the Spark Method of Selecting Steel for Industrial Purposes". Professor Keller accompanied his paper by illustrations of the spark method. He also showed a number of lantern slides.

Paul Page Whitham, consulting engineer, Seattle, Wash., has been selected by the bureau of foreign and domestic commerce to make a two years' study of port and transportation facilities of Russia and the far east. He will investigate ports and their equipment, railways, canals, river navigation, and intelligence communication facilities in order to secure reliable data for the guidance of American exporters and ship owners.

Gustaf Akerlund and Geo. W. Semmes, formerly chief engineer and assistant chief engineer, respectively, of the Standard Gas Power Co., have established a consulting and contracting engineering business under the name of Akerlund & Semmes, with headquarters at 17 Battery place, New

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

York. The firm will specialize in gas producer equipment for power as well as for metallurgical and ceramic ware furnaces.

W. W. Hall, whose resignation from the Republic Iron & Steel Co., Youngstown, was announced in the March 1 issue of *The Iron Trade Review*, has been connected with the Republic company for the last 18 years. Mr. Hall joined the staff of the company when the general offices were located in Chicago, after having spent some time with a middle western railroad. He has been in charge of

W. W. HALL

the Pittsburgh sales office of the Republic company for about eight years. Mr. Hall's resignation is reported to be effective April 1, after which time he will be identified with the Columbia Steel & Shafting Co., Pittsburgh.

The new munitions standards board, one of the advisory boards of the national defense council, will be headed by Howard E. Coffin, Detroit. The work of the new board will be to standardize, as far as possible, the munitions and materials for war purposes which the government might require in order to facilitate the production of munitions and to obtain greater economy. It is understood that this work is largely of a technical character, relating to specifications and drawings which are used by the manufacturers. The board will be composed of seven members whose civilian training has given them special experience in manufacturing and engineering. Frank A. Scott, vice president of the Warner & Swasey Co., Cleveland, who, as an associate member of the naval consulting board made a canvas, of the Cleveland district for the war and navy departments last summer, has been made a member of the new board.

William Smith, formerly general master mechanic of the Pennsylvania Steel Co., has been appointed general master mechanic of the Worth Brothers Co. branch of Midvale Steel & Ordnance Co., Coatesville, Pa.

Barton R. Shover, electrical engineer, Pittsburgh, will talk about the manufacture of steel in India, March 19, before the Pittsburgh Foundrymen's Association. Mr. Shover was general manager of the Tata Iron Works, Sakchi, India.

W. E. Wolfram, who recently terminated 11 years' service as superintendent of the projectile department of the Bethlehem Steel Co., South Bethlehem, Pa., has been presented by his fellow employes with a diamond studded watch charm, gold chain and gold knife.

Dr. Ira N. Hollis, president of the American Society of Mechanical Engineers, has appointed the following nominating committee for officers for the ensuing year: Willis H. Carrier, chief engineer, Buffalo Forge Co., Buffalo; Frederick W. Gay, consulting engineer, G. J. White Engineering Corporation, San Francisco; Andrew M. Lockett, president, A. M. Lockett & Co., Ltd., New Orleans; Paul B. Morgan, treasurer, Morgan Construction Co., Worcester, Mass.; Louis E. Strothman, manager, Pumping Engine and steam turbine departments, Allis-Chalmers Mfg. Co., Milwaukee.

B. A. Hegeman Jr., formerly president of the United States Metal & Mfg. Co., 165 Broadway, which recently was liquidated, has become president of the National Railway Appliance Co., dealer in railway supplies of all kinds, with main offices at 50 East Forty-second street, New York. This company takes over the railroad supply department of the United States Metal & Mfg. Co. Other officers of the company are: Chas. C. Castle, first vice president; Harold A. Hegeman, vice president and treasurer; F. C. Dunham, assistant to the president, and Edward D. Hillman, secretary and engineer. All of these men formerly were a part of the organization of the United States Metal & Mfg. Co.

J. M. Schlendorf, who has been appointed sales manager of the Central Steel Co., Massillon, O., has been actively associated with the iron and steel industry for a number of years. He has given a great deal of study during that time to the manufacture and uses of alloy steels, a fact

J. M. SCHLENDORF

that especially fits him for his new position. Mr. Schlendorf was associated with the United States Steel Corporation for 14 years, during which time he was in the sales organization of the American Sheet & Tin Plate Co. For the last two years, he has been in the purchasing department of the Willys-Overland Co., Toledo, O.

John A. Topping, chairman of the Republic Iron & Steel Co., is spending several weeks at Hot Springs, Ark.

T. Hart Given, president of the Farmers Deposit National Bank, Pittsburgh, has been elected a director of the Crucible Steel Co. of America, to fill the vacancy caused by the recent death of C. C. Ramsey.

Business News of Nation's Capital

Work of Preparedness Receives Serious Attention of Cabinet Members—Bureau of Ordnance Opens Bids on Projectiles—Local Committees of Commercial Organizations Will Aid War Department in Mobilization Plans

Bureau of *The Iron Trade Review*,
708 Metropolitan Bank Bldg.,

WASHINGTON, March 13.—Plans to rush construction of naval vessels are being completed by the navy department. With this end in view, Secretary of the Navy Daniels has held and is holding conferences with steel manufacturers, ship builders and labor representatives. In addition, the department is conducting extensive correspondence with interests represented in these three lines. After a two-day conference last week between the secretary and prominent ship builders, an agreement was reached by which the latter are to perform naval work upon a basis of 10 per cent net profit plus overhead charges. It is presumed that a similar arrangement will be suggested by Mr. Daniels to steel manufacturers who supply structural and ordnance material for the ships. Samuel Gompers, president of the American Federation of Labor, has taken up the labor situation, and representatives of that organization are in conference here threshing out the details. It has been indicated that the labor representatives, in accordance with the example set by steel manufacturers and ship builders, will pledge their loyal support to the government and give it entire precedence in the matter of aiding it in executing its preparedness program. The department of labor has also taken up the question and is exerting its best efforts toward seeing that the required labor is secured.

The plan to pay a profit of 10 per cent plus overhead charges is the same system proposed by ship builders last fall with regard to the building of battle cruisers. But Mr. Daniels was utterly unable to agree at that time with the ship builders as to the items that should be included in the overhead charges. The idea he had at that time would actually mean heavy losses to ship builders. It is somewhat difficult to see how the plan can now be worked out satisfactorily without going to the courts ultimately, but all controversies are being avoided owing to the pressing needs of the department. It is proposed that accountants ascertain the overhead charges by examining the books of ship builders, and it seems apparent a similar course will be pursued with regard to steelmakers who supply material for the navy. It has been indicated that a satisfactory way of settling upon fixed overhead charges may be reached by the employment of public and department accountants.

The first bids in connection with the new building program will be opened tomorrow. Of the six scout cruisers for which bids are to be opened, four were authorized by the naval act passed at the first session of the sixty-fourth congress for the fiscal year 1917. But one contract was left, Mr. Daniels having found the other bids exceeded the appropriations. In consequence the appropriations for the scout cruisers, as well as the four battle cruisers authorized at the same time, were increased by the naval act passed just before congress adjourned on March 4. On April 11 bids for 38 submarines will be opened.

The new act authorizes the construction of three battleships, one battle cruiser, three scout cruisers, 15 destroyers, 18 submarines, one destroyer tender and one submarine tender. An emergency appropriation of $18,000,000 is provided specifically for the construction of 20 coast submarines in addition to the 18 submarines for which money is provided in the bill of the three-year program, making 38 submarines specifically appropriated for in the new act.

Will Aid War Department

Washington, March 13.—In order to hasten the purchase of supplies for the war department and to aid in a general mobilization scheme, local committees of affiliated commercial organizations of the country have been named by the chamber of commerce of the United States. This was done at the request of Secretary of War Baker in his capacity as president of the council of national defense. These committees will cooperate with the army depot quartermasters in buying requirements which have been authorized by law. Among the members of these local committees are Henry R. Towne, New York, president of Yale & Towne Mfg. Co.; H. B. Lyford, Chicago, vice president of Hibbard-Simmons-Bartlett Co.; Alva C. Dinkey, Philadelphia, president of Midvale Steel & Ordnance Co.; Thomas R. Akin, St. Louis, president of Laclede Steel Co., and W. D. Horsford, Omaha, vice president of John Deere Plow Co.

Open Projectile Bids

Washington, March 13.—Bids were opened last week by the bureau of ordnance, navy department, for 3,700 14-inch Class B projectiles and six items of cast iron shells.

The lowest bidder who submitted figures on the entire lot of Class B projectiles was the Bethlehem Steel Co., at $290 each, delivery to begin in 14 months and completed in six months thereafter. The Crucible Steel Co., however, bidding on 500 of these shells, submitted a figure below others at $285 each, delivery to be made in 90 days. Other bidders on this type of shell included the American Clay Machinery Co., Bucyrus, O., 3,700 shells, $294.85 each, delivery to begin in 14 months, and to continue at the rate of 500 per month thereafter; Washington Steel & Ordnance Co., 2,000 shells, $320 each, delivery to begin in 365 days, and to continue at the rate of 500 per month thereafter; Midvale Steel & Ordnance Co., 3,700 shells, $325 each, delivery to begin in 455 days, and to continue at the rate of 500 each two months thereafter; the E. W. Bliss Co., 3,700 shells, $475 each, delivery to begin in eight months and completed in 12 months.

The cast iron shells involved 3,500 3-inch, 15-pound; 1,000 3-inch (1909); 500 3.8-inch; 500 4.7-inch; 100 5-inch, and 500 6-inch. The Bethlehem company and the Raleigh Iron Works, Raleigh, N. C., were the only makers who submitted figures on the entire lot. The Raleigh concern was the lowest on the 3.8-inch shells, at $6.15 each, boxed, delivery to be completed in 140 working days; on the 4.7-inch shells, at $8.20 each, boxed, delivery in 95 days; and on the 5-inch shells, at $9.85 each, boxed, delivery in 190 days. The Steel Products Co., Huntington, W. Va., was the lowest bidder on the 6-inch shells, at $11.09 each, boxed, delivery to be completed on Aug. 31. The Tredegar Co. was the lowest on the 3-inch, 15-pound shells at $2.23 each, boxed, 1,750 in May and 1,750 in June.

Denies Corporation is a Monopoly

Richard V. Lindabury, Representing Corporation in Dissolution Case Before Supreme Court Denies Charge of George Carroll Todd, Assistant Attorney General, That Inherent Effect of Organization of Corporation is to Restrain Trade

Bureau of *The Iron Trade Review*,
708 Metropolitan Bank Bldg.

WASHINGTON, March 13. — After six years of legal controversy the government suit to dissolve the United States Steel Corporation is drawing to an end before the supreme court. Arguments were begun before that tribunal last Friday afternoon, and will be completed tomorrow afternoon. Each side was allotted six hours instead of the customary three hours. The government took the case before the highest judicial tribunal of the land on appeal from a decree of the United States district court of New Jersey, which dismissed the suit.

The department of justice is seeking to have the decision of the lower court reversed, and the case remanded with direction to work out a plan for the effectual dissolution of the Corporation after hearing both the government and the defendants; or, if no such plan can be agreed upon, to give effect to the requirements of the statute through the appointment of a receiver or by enjoining the movement of the products of the Corporation in interstate commerce. Charges of the government are pointedly denied by the Corporation. Its counsel refers to the decision of the lower court, and the plain facts in the case, to support its plea that the decision be affirmed, and the Corporation be permitted to remain in its present form.

Representing the government as counsel are George Carroll Todd, assistant to the attorney general: Henry E. Colton, and John William Davis, solicitor general of the department of justice. The Corporation is represented by Richard V. Lindabury, Daniel A. Reed, Charles A. Severance, and George Wellwood Murray. Only seven of the nine justices are sitting during the arguments. The two absent members of the court are Justice James Clark McReynolds, and Justice Louis Dembitz Brandeis. Justice McReynolds was disqualified because he was attorney general while the case was being prosecuted. Justice Brandeis retired voluntarily. It is presumed he did so because of his writings of the past regarding the Corporation, which were extremely unfavorable to it. The members who are presiding at the arguments include Chief Justice Edward Douglass White, Justice Joseph McKenna, Justice Oliver Wendell Holmes, Justice William R. Day, Justice Willis VanDevanter, Justice Mahlon Pitney, and Justice Hessin Clarke.

For the government, the underlying principles of the case were outlined by Mr. Todd, who opened the arguments. A similar role for the Corporation was assumed by Mr. Lindabury, who immediately followed Mr. Todd. According to present plans the government will close the arguments through Mr. Davis. Mr. Murray probably will close the arguments for the Corporation, preceding Mr. Davis.

Assails Steel Company

Mr. Todd, sticking closely to the government brief, painted the Corporation in dark colors. He assailed the old pooling agreements in which it participated; charged that not only was the Corporation a monopoly in restraint of trade, occupying an overwhelmingly preponderant position in the steel industry, but that its constituent units were in themselves monopolies before they were absorbed into the holding company in 1901; also he claimed the Corporation is grossly overcapitalized, and that its subsidiaries themselves had been grossly overcapitalized before they were taken over by the parent company. He wove into his arguments the history of the entire Corporation and its units, as he saw it, naming each of the latter, when and how it was organized, by whom, and its alleged position in the trade; he said that upon the formation of the "supercombination", prices of steel products rose violently, being doubled and even trebled in some instances, and asserted this manifested the power of the Corporation, and that, indeed, its purpose was to increase prices and "exploit the public".

Corporation Defense

In a quiet, but vigorous voice, Mr. Lindabury took up the defense. He relied principally upon his memory and a few written notes to present his arguments. His plea was masterful. Repeatedly asked questions by members of the court, he had no difficulty in replying in detail without referring to written facts, save in a few instances.

The lower court, he said, had rendered two decisions. They differed on minor points, he explained, but all the judges agreed that the Corporation at the time it was organized did not acquire a monopoly, never possessed a monopoly, and never attempted a monopoly. All agreed also, he said, that the Corporation never restrained trade, or attempted to restrain trade, except in the case of the so-called Gary dinner movement, started on Nov. 7, 1907, one week after the panic broke. The history of the movement was outlined, and it was explained its purpose was to prevent a destructive panic in the trade. Mr. Lindabury pointed out specifically that this movement was not confined to the Corporation, but included 90 per cent of the steel producers of the country. Judge Woolley and Judge Hunt of the lower court, it was said, held there was no impropriety in the movement itself, but claimed it was kept up longer than was justified. There was no monopolistic power proposed through the movement, Mr. Lindabury urged, and he maintained emphatically that mere size of a corporation was not prohibited by the Sherman law. Judge Woolley, he asserted, conclusively showed the Corporation did not exert its power to suppress competition, and that if it had made an attempt it would have failed.

Two great questions involved in the proceedings, he urged, related to whether or not the inherent effect of the organization of the Corporation was to restrain trade, and, if there was no such effect, whether or not there was intent to produce such a result. He denied there was such an inherent effect, or such an intent, and moreover disclaimed that the Corporation now restrains trade, maintains a monopoly, or that there is a dangerous probability that it will do so. In an effort to prove his contentions, he recited facts and figures at great length, showing the relative output of the various products of the corporation and independent manufacturers, and their control of such properties as ore and coal mines. The government, he said, while putting in statistics regarding the production of the different companies of the Corporation, failed to show whether this production was for the use of the Corporation in some other form or was for sale. It was stated that a vast production is used by the Corporation in manufacturing semi-finished and finished material. So, too, he said, the production of these subsidiaries was to a considerable extent non-competitive because of geographical reasons, railroad rates, etc., the products being sold in territories where there was little or no competition offered.

Iron and Money: Fact and Comment

American Steel Foundries Prepares for Rainy Days—Earns 23 Per Cent on Capital Stock in Year 1916

AN EXCELLENT example of the conservative financial policy adopted by the management of most iron and steel companies is observed in the annual report of the American Steel Foundries. This company last year did a gross business exceeding by 50 per cent its best previous year, while net profits exceeded previous records by a similar margin. But the company has not taken advantage of this sudden windfall to pay stockholders long awaited dividends. Instead, it has made large allowances for depreciation and other reserves and has started to retire as much as possible of its bonded indebtedness, in order to lessen the burden of interest in normal years.

Only one dividend of 1¼ per cent was paid during 1916 on the $17,184,000 capital stock. Yet the gross sales were $31,361,005, as compared with $10,024,870 the preceding year and $19,463,521, the highest previous year. Earnings from operations, after deducting all manufacturing and general expenses, were $4,842,237. Earnings available for dividends amounted to 23 per cent on the capital stock. The company's 6 per cent debenture bonds were reduced by $373,000, leaving a total outstanding as of Dec. 31, 1916, of $1,586,500, out of the original issue of $3,900,000. The company also bought in $344,000 of the 4 per cent debentures at an average cost of 87.48 per cent. Of the original issue of $3,436,800 there were outstanding at the end of the year $2,060,800.

Thus it will be observed that the American Steel Foundries is taking full advantage of the present good business to entrench itself in as strong a position as possible. President R. P. Lamont, in his remarks to stockholders, explains the company's policy as follows:

"In view of the earnings, it may seem to some of our stockholders that dividends could have been resumed at an earlier date, but the large volume of our business kept us short of cash during the entire year, and the many uncertainties surrounding the whole business situation, made it necessary to follow a conservative policy as to dividend disbursements.

"It must be kept in mind that a considerable part of the earnings for the year were derived from business outside of our regular line of work, and necessarily of a temporary character. In the judgment of your directors, it would be a mistake to pay out these excess earnings in dividends. They should be conserved until all of our contracts for war materials are finished, and if at that time conditions warrant it, these excess profits should be used to call and retire our 6 per cent bonds and provide for the payment of our debentures when due. At the present time we are obliged to take from our profits about $750,000 a year for interest on and retirement of bonds and debentures before we have anything for surplus available for dividends. This is equal to 4½ per cent of our outstanding stock. It has been a heavy load in dull years and it will be a great relief to get these bonds and debentures out of the way. The prospects for 1917 are good. All plants are running to capacity, and we have already on hand orders enough to carry us well into the second half of the year. Of course, the general business situation is uncertain, to say the least, but if we meet no unusual difficulties we are reasonably sure of another satisfactory year."

The income accounts for the past two years compare as follows:

	1916.	1915.
Gross sales	$31,361,005	$10,024,870
Net earnings	4,842,237	517,325
Depreciation	739,413	204,083
Net profits	4,102,824	313,242
Other income	122,986	189,523
Total income	4,225,810	502,765
Interest charges	257,240	238,609
Net surplus	3,968,570	264,156
Sinking fund	550,513	577,590
Surplus for 1916	3,418,057	*313,434

*Deficit.

Radiator Earnings Break All Records

The American Radiator Co., Chicago, joins the long list of iron, steel and allied industrial companies reporting high record earnings in 1916. This company's annual report, just issued, shows net profits of $2,604,068 in the 12 months ended Dec. 31, as compared with $2,364,953 the previous year. This high mark was established despite the increased cost of pig iron and other raw materials and labor. Stockholders of the American Radiator Co. last week ratified an increase in the common stock from $9,000,000 to $22,000,000, $4,092,800 of which is to be issued March 15 as a 50 per cent stock dividend. A regular quarterly dividend of 3 per cent will be paid on the common stock March 31, which will apply to the increased issue. This compares with a previous quarterly rate of 4 per cent on the smaller issue. The net profits of the entire business were, therefore, equal to 12.12 per cent of the tangible assets. The financial statements compare as follows:

INCOME ACCOUNT.

	1916.	1915.
Gross income	$22,349,219	$19,745,152
Net profits	2,604,068	2,364,953
Dividends	1,519,696	1,519,696
Surplus	1,084,371	845,257
Total surplus	9,057,214	7,972,843

BALANCE SHEET.

ASSETS.

Realty, patents, etc., after add. and deprec.	$12,362,430	$11,978,122
Cash	2,997,408	2,700,581
Notes receivable	195,028	174,806
Accts. receivable	1,679,145	1,291,691
Inventory	3,990,792	3,960,735
Total	$21,224,805	$20,105,935

LIABILITIES.

Prfd. stock	$3,000,000	$3,000,000
Common stock	8,185,600	8,185,000
Accts. and bills pay	981,990	947,492
Surplus	9,057,215	7,972,843
Total	$21,224,805	$20,105,935

Stocks Steady in Face of Crisis

Although this country has taken one of the few remaining steps preliminary to actual declaration of war by its decision to arm its merchantmen against submarine attacks, the stock market has reflected confidence in the business outlook. This is particularly true of the iron and steel stocks, which have advanced several points in the face of the international crisis. Activity naturally has not been pronounced, but current conditions have not been deemed auspicious for operations by the bears. The new demands backed by immense new buying power of the United States government in its preparedness program are factors in the industrial field just beginning to be reckoned with by the stock market. Quotations on a number of iron, steel and industrial stocks at the close of the New York stock exchange, March 10, and net changes for the preceding week follow:

	Close Mar. 10.	Net chg.
American Can	46½	+2⅝
American Can, prfd.	109	+1
American Car & Fdy.	69¼	+3⅝
American Car & Fdy., prfd.	117	+ ½

American Locomotive	72⅜	+1⅜
American Locomotive, prfd.	104	+ ⅜
American Steel Foundries..	64¾	+4⅜
Baldwin Locomotive	53⅜	+ ⅜
Baldwin Locomotive, prfd...	101	+ ⅛
Bethlehem Steel	140	+9¾
Colorado Fuel & Iron.....	48¼	+1½
Continental Can	91½	— ⅛
Continental Can, prfd.....	111	— ½
Crucible Steel	67½	+1⅜
Crucible Steel, prfd.....	113	+ ½
General Electric	166	+2
Gulf States Steel.....	125½	+14½
Gulf States Steel, 1st prfd..	107	+3
Internat'l Harv. of N. J....	116	+1
Inter. Harv. of N. J., prfd.	117½	— ½
Lackawanna Steel	85⅞	+4⅞
Nat'l Enmlg. & Stmp. Co..	35⅛	+2⅜
Nat'l En. & Stmp. Co., pr..	101	+5
Pressed Steel Car.....	80⅞	+4⅝
Pressed Steel Car, prfd.....	105	+1
Pullman Palace Car.....	105	+1
Republic Iron & Steel.....	82	+3½
Republic Iron & Steel, prf.	103⅞	+2⅜
U. S. C. I. P. & Fdy. Co.	21	+2½
United States Steel.....	112⅞	+4½
United States Steel, pr.....	118⅛	+ ⅜
Westinghouse Mfg.	51½	+1¾

Maximum quotations for a number of steel and industrial stocks, not quoted on the New York stock exchange at the close March 9 and March 2, follow:

	Mar. 9.	Mar. 2.
American Radiator	440	445
American Ship Building.....	62	62
Chicago Pneumatic Tool.....	69	68½
LaBelle Iron Works.....	86	86
Lake Superior Corp'n.....	22⅛	21⅞
Stewart-Warner Speed. Co...	85½	85
Warwick Iron & Steel Co...	9¼	9⅛
Westinghouse Air Brake.....	150	149½
Westingh'se Elec. & Mfg. Co.	50¾	50

A. S. M. E. to Meet

In Cincinnati May 21-24—Will Hold Joint Session with Tool Builders

The American Society of Mechanical Engineers will hold its spring meeting in Cincinnati, May 21-24, instead of May 22-24, as previously announced. The change in the date for the opening of the meeting was made in order to permit a joint session with the National Machine Tool Builders' Association. This session will be in charge of the local committee representing the tool builders. Several papers will be presented dealing with industrial education and employes' service as developed in Cincinnati. A session devoted to papers on the manufacture of munitions, one on machine shop practice and one on gas power, will be held. An attractive program of entertainments has been arranged. A number of plant inspections and a sightseeing trip for the ladies have been planned.

Acquires New Plants

The Dodge Mfg. Co., Mishawaka, has acquired the properties and will control the manufacture of all the products of the Oneida Steel Pulley Co. and the Keystone Steel Pulley Co., Oneida, N. Y. The merger gives the Dodge company an increased production of 1,500 steel split pulleys per day. The present capacity of the Mishawaka plant is 1,500 wood split pulleys and 1,000 iron split pulleys, bringing the total for the new company up to 4,000 per day. The Dodge Mfg. Co. has been identified in the pulley industry since 1882, when Wallace H. Dodge, founder of the company, developed the bushing system by which a range of 108,000 pulleys with fixed bores, faces and diameters may be covered by an extreme total of 2,700 pulleys of standardized bores and 40 bushings of proper shaft dimensions. A cast iron split pulley was introduced in 1900 and later the iron center and wood rim type was developed. The acquisition of the Oneida and Keystone companies adds to the original Dodge line two types of steel split pulleys.

Sets New Record

February Unfilled Orders of Steel Corporation Exceed Those of December

New York, March 10.—Unfilled orders on the books of the United States Steel Corporation as of Feb. 28, were 11,576,697 tons. This figure shows an increase of 102,643 tons, as compared with Jan. 31, the increase being due not only to increased bookings, but to the fact that shipments from plants were delayed by the railroad congestion. Comparison of orders on books at the close of February with previous months follows:

Date.	Total.	Change, tonnage.	Change, per cent.
Feb. 28, 1917..	11,576,697	102,643+	0.90+
Jan. 31, 1917..	11,474,054	73,232—	0.64—
Dec. 31, 1916..	11,547,286	488,744+	4.43+
Nov. 30, 1916..	11,058,542	1,043,282+	10.41+
Oct. 31, 1916..	10,015,260	492,676+	5.18+
Sep. 30, 1916..	9,522,584	137,133—	1.42—
Aug. 31, 1916..	9,660,357	66,765+	.69+
July 31, 1916..	9,593,592	46,866—	0.48—
June 30, 1916..	9,640,458	297,340—	3.09—
May 31, 1916..	9,937,798	108,247+	1.11+
Apr. 30, 1916..	9,829,551	498,550+	5.34+
Mar. 31, 1916..	9,331,001	762,035+	8.89+
Feb. 29, 1916..	8,568,767	646,199+	8.16+
Jan. 31, 1916..	7,922,767	119,547+	1.53+
Dec. 31, 1915..	7,803,220	616,731+	8.58+
Nov. 30, 1915..	7,189,489	1,024,037+	16.63+
Oct. 31, 1915..	6,165,453	847,834+	14.06+
Sep. 30, 1915..	5,317,618	409,163+	8.13+
Aug. 31, 1915..	4,908,455	20,085—	0.04—
July 31, 1915..	4,928,640	250,344+	5.35+
June 30, 1915..	4,678,196	413,598+	9.69+
May 31, 1915..	4,264,598	102,354+	2.46+
Apr. 30, 1915..	4,162,244	93,505—	2.21—
Mar. 31, 1915..	4,255,749	89,622—	2.06—
Feb. 28, 1915..	4,345,371	96,800+	2.28+
Jan. 31, 1915..	4,248,571	411,928+	10.74+

Will Enlarge Plant

The Wright Wire Co., Worcester, Mass., advises that it is enlarging its plant to an extent which will make this company the largest independent producer of wire in the eastern states. Most of the additions now being made are at its plant in Palmer, Mass., where four 2-story and basement buildings, brick and steel sash construction, are being erected. The extensions being made at Palmer follow a new building, which has just been completed and occupied. In addition, the company expects to begin work on still another addition at Palmer in the near future. The construction work now under way at Palmer also includes a large circular smoke stack and approximately one-half mile of railroad track in the company's yard. The Worcester plant is being extended by a 2-story building, 230 feet long, which is now under construction.

Spot Benzol

Scarce Due to Car Shortage—Phenol and Solvent Naphtha Weak

New York, March 12.—Tank cars are scarce and this condition is having some effect upon the pure benzol market. Some of the makers who have spot supplies for sale are unable to ship and business is being placed with those plants located nearest the point of car supply. This transportation condition further has restricted the already limited amount of spot product that is open to purchase. Premiums have been paid for spot lots obtainable near New York. Spot and contract prices are quoted unchanged at 55 to 60 cents per gallon but the market shows an upward tendency and advances especially on spot are expected shortly by sellers. New inquiry in toluol looks more promising and a heavier volume of business is foreshadowed. There are rumors of impending government inquiries both in toluol and phenol but these are so intangible that it is believed they have been circulated for market effect. Toluol prices are from $1.75 to $2.00 per gallon on spot and from $1.50 to $1.75 on contract. Phenol is weak owing to the plentiful supplies of spot being offered. Leading sellers are quoting 45 cents per pound on spot but this figure is being shaded and 42½ cents is reported to have been done. There is no contracting of importance. Weakness also remains in solvent naphtha owing to the heavy production. The open quotation on both spot and contract is from 20 to 25 cents per gallon but these figures are not being maintained and prices vary in accordance with the quantity of the sale. The demand for sulphate of ammonia for early shipment is greater than the supply and this is keeping spot prices very strong. The buying is in small lots but there is a considerable amount of business being offered especially for export for which the tonnage is not to be had. Prices are quoted the same as last week.

The Bethlehem Steel Co. for the present has deferred the carrying out of a plan to erect at Cleveland a warehouse for the distribution of its products in that territory. Announcement of the plan to build such a structure was made several months ago.

Ship Yards Bombard Tool Builders

Milliken Bros., Newport News, Sun and Staten Island Yards Issue Requirements Totaling Millions—Cranes Are Being Purchased Freely by Steel Plants —Railroads Come Into Market—Westinghouse Buys Lavishly

THE biggest business now before the machine tool trade is comprised in the requirements of the Westinghouse Electric & Mfg. Co. for the large new ship machinery plant which it is to erect at Essington, Pa. This business includes about 200 large machine tools and involves an outlay of approximately $1,000,000. Orders are about to be distributed from the company's offices at East Pittsburgh. It is understood that some of this business already has been closed. Most of the other current developments in the machinery market are in connection with the requirements of other ship building or ship equipment companies. Wallace Downey and associates, formerly of the Standard Ship Building Corporation, New York, who recently purchased the steel fabricating plant of Milliken Bros. Co., Staten Island, N. Y., have made inquiries with respect to additions to the present equipment at the Milliken plant which will fit it for the building of ships. The apparatus to be purchased is expected to include punching and shearing machinery, cranes, etc. The Newport News Ship Building & Dry Dock Co., Newport News, Va., which recently put out preliminary inquiries for a large amount of equipment, is expected shortly to issue a formal list of these tools for detailed bids. The Sun Ship Building Co., Chester, Pa., which recently issued an important list of punching and shearing and other equipment, has not yet taken action on these requirements, but orders are expected to be distributed without much delay. The officials of the League Island navy yard, Philadelphia, last week sent forward to the navy department at Washington the plans and specifications for important additions which are to be made to that yard. These provide for the erection of a 1,000-foot dry dock, a 1,000-foot pier, a new foundry and the erection of a 350-ton traveling crane. This crane not only will be larger by 100 tons than any now in use in this country, but it will have only one trolley. This crane will be employed for handling the new 18-inch guns. The Staten Island Ship Building Co., Staten Island, New York, is about to buy cranes and other equipment for a foundry which it is about to erect.

Among large requirements which are expected to come up shortly are those of the Midvale Steel & Ordnance Co. This concern now has pending a large ladle crane for its Coatesville plant and five cranes for its Nicetown plant. It is expected to come into the market shortly for large gun lathes and additional heavy cranes. The Bridgeport Steel Co., Bridgeport, Conn., is in the market for a number of steam hammers, some cranes and other equipment. It is to erect an open hearth and forging plant. The Pennsylvania railroad is understood to have withdrawn the list of equipment on which it inquired a few weeks ago, due to the high prices. The Raritan Copper Works, Perth Amboy, N. J., has let a contract for a 10-ton dock gantry crane to Heyl & Patterson, Pittsburgh. The Warren Foundry & Machine Co., Phillipsburg, N. J., has put out an inquiry for six traveling cranes, ranging from 5 to 20 tons in capacity. The Stamford Rolling Mills Co., Stamford, Conn., is inquiring for a 5-ton crane. Charles P. Perin, 2 Rector street, New York, already has placed orders for some cranes for the Tata Iron & Steel Co., Sakchi, India, but most of the equipment to be placed for this concern still is pending. H. M. F. Tuckwell, general purchasing agent of the Tata company is in this country with headquarters at Mr. Perin's office, to co-operate in closing for the company's requirements. The Tata company recently decided not to purchase its machine tool requirements here, but has placed these with English builders. The Interborough Rapid Transit Co., New York, has let a contract to the Northern Engineering Co. for two 35-ton and one 30-ton cranes to be installed in new sub-stations.

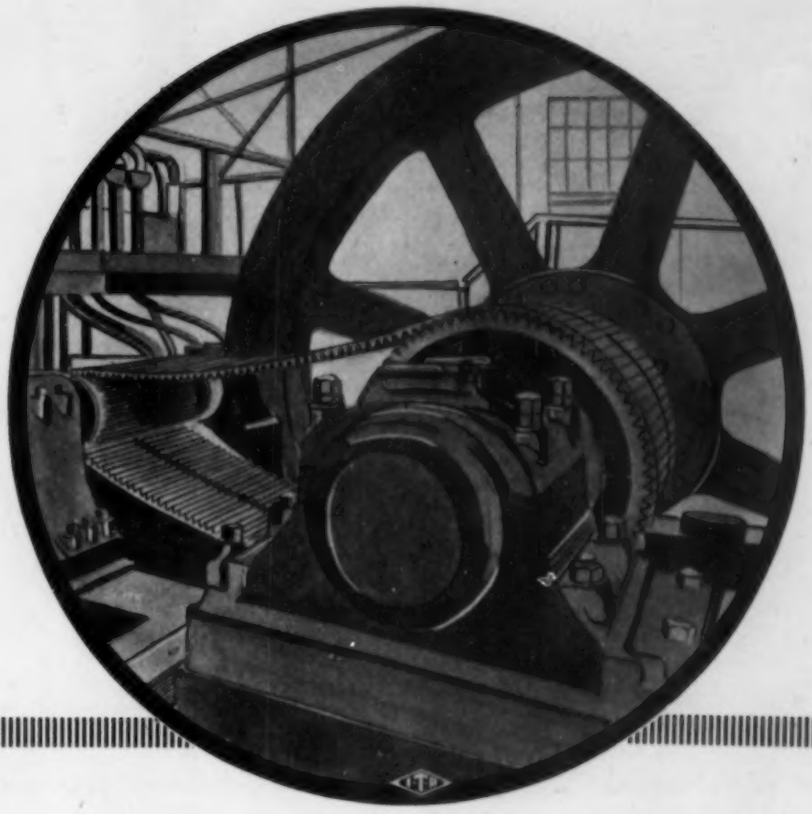
Good Lists Appear in Chicago Market

STOCKS of machinery in the hands of dealers in Chicago are being depleted by a steady demand and frequent sales. Most machines from manufacturers are shipped direct and few are being delivered for stock. Second-hand equipment and a broken line of new machines make up the assortments offered for immediate delivery. Buying is largely in small lots or for single tools. Railroads are more active, as evidenced by the current inquiry of the Grand Trunk for a large list for its Port Huron shops. The list in detail appears on page 644. A small inquiry from the Santa Fe railroad is published on page 648. An Italian buyer in Chicago recently bought a few tools for shipment to Italy. The Lightfoot Steel Corporation, Springfield, Mo., is reported to have issued a tool list which appears on page 646.

Extensions to manufacturing plants with a consequent demand for equipment for new shops continues and adds to the volume of business. The Superior Steel Castings Co., Benton Harbor, Mich., will build a foundry extension which will require a 10-ton electric traveling electric crane, an electric furnace, air compressor and two 250-horsepower electric motors. The Silo Specialty Mfg. Co., Bushnell, Ill., is about to install heavy sheet metal working machinery. The Dewitt Mfg. Co., Russellville, Ark., is in the market for some equipment, including a lathe, milling machine, drill press, grinder and foundry equipment. The Kawalle Bros. Co., Manitowoc, Wis., will build a machine shop. The Standard Steel Co., Milwaukee, will build a large shop and foundry. The Atlas Foundry & Machinery Co., Tacoma, Wash., will build a foundry and machine shop. Water and power extensions are still purchasing equipment. Jacksonville, Ill., will add a pump and dynamo. Amberg, Wis., is planning to build a hydro-electric plant to supply power to other cities. Grand Junction, Colo., is about to build an auxiliary pumping plant.

Cranes Feature Pittsburgh Market

THE Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., which has completed plans for a new plant at Essington, Pa., has distributed orders for 50 electric traveling cranes, having capacities ranging from 10 tons to 100 tons. The Morgan Engineering Co., Alliance, O., will furnish 20 cranes, having



Make your Gears of Steel that Stands the Strain

Gears and Drives that operate huge motors have to undergo long, hard service. It is essential, for reliability, that they be made of material that is absolutely dependable.

To meet the demand for such a material we are producing AGATHON STEELS.

No matter what you are making—***Gears, Connecting Rods, Crank Shafts, Driving Shafts, Pistons, Cams, Springs,*** etc., there is an AGATHON STEEL specially prepared for the purpose.

ASK US FOR DETAILS.

AGATHON STEELS

will serve your purposes BEST

"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
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"AGATHON" Chrome Steel
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THE CENTRAL STEEL COMPANY

Massillon, Ohio

Detroit Office: 326-27-28 Ford Bldg., F. Walter Guibert, District Representative
Cleveland Office: Hickox Bldg., The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Bldg., 14 East Jackson Blvd. A. Schaeffer, District Representative
Philadelphia Office: 902 Widener Bldg., Frank Wallace, District Representative

J. E. Dockendorff & Co., 20 Broad St., New York, N. Y., General Export Agents

lifting capacities ranging from 30 to 100 tons, and the Factory Products Co., Pittsburgh, will install 30 cranes, with capacities ranging from 10 to 50 tons, to be furnished by the Toledo Bridge & Crane Co., Toledo, O. The Westinghouse company has not yet placed orders for any of the machine tools for its new machine shops. The machine tool list includes a diversified line of boring, drilling and milling machines, lathes, shapers, planing and slotting machines and grinding equipment. The Compania Minerva de Sierra Menera, Iagimio, Spain, through its American representatives, is tentatively negotiating for equipment for installation in a proposed steel works. Preliminary bids on seven cranes for an open hearth steel plant have been asked. Builders of heavy rolling mill machinery cannot promise deliveries for from six to 12 months.

Cleveland Dealers Busy

THE number of inquiries which are appearing in the Cleveland machine tool market are not falling off in number. The list of machines wanted by the Firestone Tire & Rubber Co., Akron, of which mention was made in the March 8 issue of *The Iron Trade Review*, has been supplemented by another list from that company, and appears on page 646 of this issue. A number of tools inquired for by that company last week have been purchased; the eight large boring mills have been placed. Some machines have not been ordered and the company is still in the market for those tools. The Buffalo & Lake Erie Traction Co., Erie, Pa., is in the market for a list of miscellaneous shop equipment. The B. F. Goodrich Co., Akron, is still in the market for a few machines. The Baxter Gear Cutting & Mfg. Co., 1831 East Fifty-fifth street, Cleveland, is still making inquiries on some large gear cutting machines. Deliveries are easing up to a certain degree. Prices on all machines remain unchanged.

Westinghouse Buying in Cincinnati

IN Cincinnati, the volume of machine tool business shows no abatement. The Westinghouse Electric & Mfg. Co. is purchasing a large list of tools, and has recently placed orders with various manufacturers in Cincinnati. That company still has a large number of planers, lathes, milling machines and radial drills to contract for, the aggregate of which will amount to close to $500,000. Machine tool builders are not concerned over the fact that present international complications may result in shipments of machinery to Europe being handicapped, as the large majority of orders on their books are for domestic delivery. The Edna Brass Works, Cincinnati, is buying equipment for a new machine shop to be built in the near future, which will be two stories, 100 x 100 feet. The Fairbanks Morse Electric Mfg. Co., Indianapolis, Ind., will build a factory, four stories, 113 x 168 feet, for which all equipment has not as yet been purchased.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

BOSTON.—The Berkeley Trust will build an 11-story building to cost $1,000,000.

BOSTON.—The brass foundry of D. W. Clark & Co., 280 West First street, South Boston, was damaged by fire Feb. 26.

BOSTON.—The Newbury Realty Co. will build an artificial stone, fireproof, 8-story building at the corner of Massachusetts avenue and Newbury street. Four elevators will be installed.

BOSTON. — The Eastern Foundry Supply Co. has been incorporated with $20,000 capital by William T. Nicholson, Providence, R. I., president; George A. Taber, treasurer and Lester W. Ingram, clerk.

EASTHAMPTON, MASS.—The Jacob & Kugler Foundry Co. will build a brick, 60 x 60-foot foundry building on East street.

GREENFIELD, MASS.—The Goodell-Pratt Co. will build a reinforced concrete, 4-story addition to its machine shop at 57 Wells street.

LAWRENCE, MASS.—The H. P. Hood & Sons Co. will build a brick, 2-story, 63 x 104-foot factory on Market street.

LOWELL, MASS. — The Hy-Carbo Steel Co. has been incorporated with $20,000 capital by Charles H. Bagshaw, president and treasurer and Isaac E. Higgins, clerk.

LYNN, MASS.—The Hulle Co., manufacturer of oil and grease, sustained a $10,000 fire loss to its plant recently.

MALDEN, MASS. — The Malden board of trade will erect two, 3-story, 50 x 300-foot and 50 x 200-foot buildings for new industries.

MALDEN, MASS. — The Boston Rubber Shoe Co. will build a brick, 4-story, 100 x 100-foot addtion to their machine shop on Oak street.

MANSFIELD, MASS.—The Harding Mfg. Co. plant was damaged to the extent of $20,000 by fire. The company makes machine tools.

NEW BEDFORD, MASS.—The Taunton-New Bedford Copper Co. will build a brick, fireproof, 1-story, 100 x 400-foot plant to cost $60,000.

PITTSFIELD, MASS.—General Electric Co. Co. has completed plans for the erection of a foundry addition.

SALEM, MASS.—J. W. Aulson & Co. are building a 1-story, 100-foot long addition to their machine shop on Oak street.

SALEM, MASS.—The Salem Electric Lighting Co. will build a brick and renforced concrete, 2-story, 60 x 114-foot building to cost $50,000 on Peabody street.

SPRINGFIELD, MASS.—Plans are being figured for a brick, 1-story, 65 x 100-foot addition to the plant of the Hendee Mfg. Co., to be used for a press room.

SPRINGFIELD, MASS. — Plans are being drawn for a brick, 3-story addition to the machine shop of the Van Norman Machine Tool Co., 160 Wilbraham avenue.

STURBRIDGE, MASS. — Snell Mfg. Co., W. K. Wilson, president, 113 Chambers street, New York, is about to erect a 1-story, 40 x 90-foot forge shop addition at its plant here.

TAUNTON, MASS.—The city will build a brick, 1-story, 124 x 160-foot, eight-room grammar school to cost $30,000 on Anderson street.

WORCESTER, MASS.—Whitcomb-Blaisdell Machine Tool Co. has let a contract for the erection of a 1-story, 27 x 102-foot foundry.

WORCESTER, MASS.—The Bartlett-Hayward Co., Baltimore, has been awarded the contract to erect a steel, 1-story, gas purifier at the plant of the Worcester Gas Light Co., Quinsigamond avenue.

WORCESTER, MASS. — The Worcester Stamped Metal Co. is about to erect another addition to its plant. This will be 1-story, 100 feet square, of brick and steel construction and will be located at the west end of the present building.

BRISTOL, CONN.—Plans are being drawn for a brick, 1-story, 50 x 350-foot rolling mill for the Bristol Brass Co.

FARLEY, CONN.—The Millers River Box Co. sustained $30,000 fire damage recently. The plant was insured for $18,000.

GROTON, CONN.—New London Ship &

Preparedness Talks with

ROLLING MILL JIM

Speed up boys, Old Uncle Sam might need all the stuff we can shoot out and then some. Let's get all set to hit her on high. You know what we need to come across. Hubbard Equipment, fellows, then watch our speed.

So long—

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Say you saw it in THE IRON TRADE REVIEW

Engine Co. is filling in ground adjacent to its present plant in order to provide space for another building to be located on the river front. This structure will be employed for heavy drop forging work.

HARTFORD, CONN.—The National Machine Co. has increased its capital stock from $60,000 to $375,000, all of which has been subscribed.

HARTFORD, CONN. — The Royal Typewriter Co. has completed plans for the erection of three plant additions which are expected to be completed by next November. The prospective additions are four stories, 50 x 310 feet, four stories, 50 x 150 feet, and two stories, 50 x 30 feet, respectively. In addition an extra story will be added to a present 1-story building.

NEW LONDON, CONN. — The D. E. Whiton Machine Co. will build a brick, 150 x 200-foot addition to its plant on Oak street.

STAMFORD, CONN.—The Harris-Hanson Foundry Co. has been incorporated with $25,000 capital by Benjamin Harris, president.

WATERBURY, CONN. — Waterbury Rolling Mills will erect three 1-story additions, 65 x 100, 32 x 150 and 19 x 66 feet respectively.

CRANSTON, R. I.—The United Lace & Braid Co. will build a brick, mill construction, 3-story, 90 x 200-foot addition to cost $75,000.

CRANSTON, R. I.—Plans have been drawn for a brick, mill construction, 1 and 2-story and basement, 165 x 180-foot factory to cost $50,000 for the Langelier Mfg. Co., Providence, R. I., machinist, in Arlington.

PAWTUCKET, R. I.—The Solvay Dyeing & Textile Co. will build a brick, 2-story, 105 x 166-foot addition to its mill to cost $40,000.

PAWTUCKET, R. I. — The Champion Horseshoe Co. will build a brick and wood, 1-story, 150 x 200-foot building and a 60 x 60-foot office building at the corner of York and Prairie avenues.

PAWTUCKET, R. I. — The Union Metal Goods Co. has been incorporated to do a manufacturing business with $25,000 capital by Arthur M. Allen, Frederick W. Tillinghast and Rush Sturgis, all of Providence, R. I.

PROVIDENCE, R. I. — Adams Bros. have been incorporated to do a general machine business with $25,000 capital by Harold R. Adams, Cranston, R. I., Clarence W. Adams and Arthur M. Allen.

WOONSOCKET, R. I. — The Gold Mark Knitting Co. will build a brick, mill construction, 3-story, 40 x 300-foot factory.

From the Alleghenies to the Sea

NEW YORK.—Warnoln Mfg. Co. has been incorporated with $100,000 capital to manufacture automobile accessories by G. A. Arnold, S. A. Campbell, S. Andrews, 12 Locust street.

NEW YORK.—Kaufmann-Morris Co. has been incorporated with $100,000 capital to manufacture autos and motor cars by G. R. Morris, I. V. and A. G. Kaufmann, 1800 Broadway.

NEW YORK.—Wilhelmina G. Bultman, 130 Washington place, is about to make alterations in a foundry building to be occupied under lease by Samuel Block, 346 Greenwich street.

NEW YORK.—Stern & Saalsberg Co., 416 West Forty-fifth street, has had plans completed by Architects Buchman & Fox, 30 East Forty-second street, for a 7-story, 50 x 100-foot manufacturing building.

NEW YORK. — Pier Machine Works has been incorporated with $50,000 capital to manufacture metallic castings, pumps and winches by E. Praxmarer, A. Foshay, A. G. Thaanum, 92 Haven avenue.

NEW YORK. — Union Thermometer Co. has been incorporated with $50,000 capital to manufacture thermometers and surgical appliances by F. D. W. Searing, L. S. Ehrich, W. H. Jeffers, 128 Broadway.

NEW YORK.—Valley Mold & Iron Corporation has been organized with $2,500,000 capital to manufacture iron, steel and other metals, by A. E. Connelly, W. G. Dunnington Jr., H. T. Hartwell, 5 Nassau street.

NEW YORK.—Yuess Mfg. Corporation has been organized with $50,000 capital to manufacture writing machines by M. L. Schallck, S. Strassbourger, J. T. Cossmann, 640 Riverside drive.

NEW YORK.—American Conveyor Corporation has been organized with $250,000 capital to manufacture conveyors, cranes and engines by A. W. Hester Jr., B. W. Tucker, C. G. Armstrong, 149 Broadway.

NEW YORK. — Radio Controller Corporation has been organized with $120,000 capital to manufacture dispatchers, time-recording clocks, radio apparatus, by R. L. Lockwood, W. Lenthers, W. B. Cowen, 15 Union Square.

NEW YORK.—Gas & Coke Oven Corporation has been organized with $105,000 capital to manufacture coke ovens, stamp mills, smelting machinery and to mine coal, by M. McEnany, L. M. Woodworth, G. H. Rowe Jr., 122 Milton street, Brooklyn.

ATLANTIC CITY, N. J.—Atlantic City Hotel Co. has been incorporated by E. H. Cuthbert to erect new hotel, 130 feet along boardwalk and 325 feet along Delaware and States avenues, to cost $1,750,000.

ATLANTIC CITY, N. J.—Federal government will erect post office to cost $60,000.

BAYONNE, N. J. — Board of education plans to erect a new school to cost $275,000.

ELIZABETH, N. J.—The Elizabeth General Hospital will erect a new institution to cost $500,000. It will be five stories with a separate laundry and garage.

ELIZABETH, N. J.—Work has been started on the new plant of the Standard Fittings Co.'s factory on Butler street. The plant will be 100 x 300 feet and will cost $55,000.

ELIZABETH, N. J.—The Singer Mfg. Co. has awarded a contract to the Austin Co., Cleveland, for a 1-story, 150 x 200-foot brick and steel foundry.

JERSEY CITY, N. J.—The American Type Foundries Co. has purchased 12,500 square feet at the corner of Maple and Monitor streets.

JERSEY CITY, N. J.—Booth Chemical Co. has been incorporated with $100,000 capital to manufacture chemicals by L. M. Booth, Plainfield; T. H. Fisher, Jersey City; Arthur J. Donniez, Brooklyn.

NEWARK, N. J.—The Dolph Mfg. Corporation has let a contract for the erection of a 1-story, 25 x 65-foot plant addition.

NEWARK, N. J.—Alcohol Products Co. has been incorporated with $650,000 capital to manufacture and deal in anhydrous and aqua-ammonia and chemicals by Harold T. Edgar, Henry M. Miner, Brooklyn, Harold W. Haines, Milburn.

PERTH AMBOY, N. J.—Roessler & Hasslacher Chemical Co. has been granted a permit to erect a 1-story addition to its plant in Rector street.

PERTH AMBOY, N. J.—The Raritan Copper Works has been granted a permit to erect a new 1-story brick and steel addition to cost about $15,000.

TRENTON, N. J. — John A. Roebling's Sons Co. is about to start work on the erection of a 1 and 3-story, 95 x 594-foot addition.

TRENTON, N. J.—State of New Jersey will build an addition to the state house. State Architect George S. Drew will draw the plans. State house commission has asked for new administration building.

ALLENTOWN, PA. — International Motor Co., Vernon Monroe, president, and B. A.

Big List Out

The Grand Trunk railroad has issued an inquiry for equipment for its new shops at Port Huron, Mich., G. W. Caye, Montreal, is general purchasing agent. In addition to about 50 tools for the woodworking shops the list contains the following machines:

One electric welder.
One 16-inch x 10-foot tool room lathe.
One 22-inch x 22-foot engine lathe.
One 60-inch x 18-foot engine lathe.
One 42-inch coach wheel lathe.
One 52-inch vertical boring and turning mill.
One 48-inch, 300-ton hydraulic car wheel press.
One 36 x 37 x 37-inch x 12-foot planer.
One 20-inch triple-geared shaper.
One 24-inch milling machine.
One 1½-inch bolt pointer.
Three vertical drilling machines, 20-inch, 24-inch and 28-inch.
One No. 4 power hack saw.
Two emery wheel stands.
One combination quintuple shear and punch.
One combination cutter, reamer and drill grinder.
One double car axle journal turning lathe.
One 1½-inch pipe machine.
One pipe bending machine, 1 to 2-inch.
One cock grinding machine.
One drill press.
One 36-inch lathe.
One emery wheel and column.
One bolt heading and forging machine.
One 4-inch forging machine.
One bulldozer.
One 24-inch and one 30-inch double-end punch and shear.
One high-speed friction saw.
One 100-inch gate shear.
One single punch machine.
Two bolt threaders, 1¼ and 2½-inch.
One universal radial drill press.
One 2,500-pound steam hammer.
One compression riveter.
Two 12,000-gallon oil storage tanks.
One 1,-inch continuous rivet machine.
Five forging furnaces.
Two upright drills.

Blackwood
STEELS

If you are a user of

CASE HARDENING BOXES
and
LEAD and CYANIDE POTS

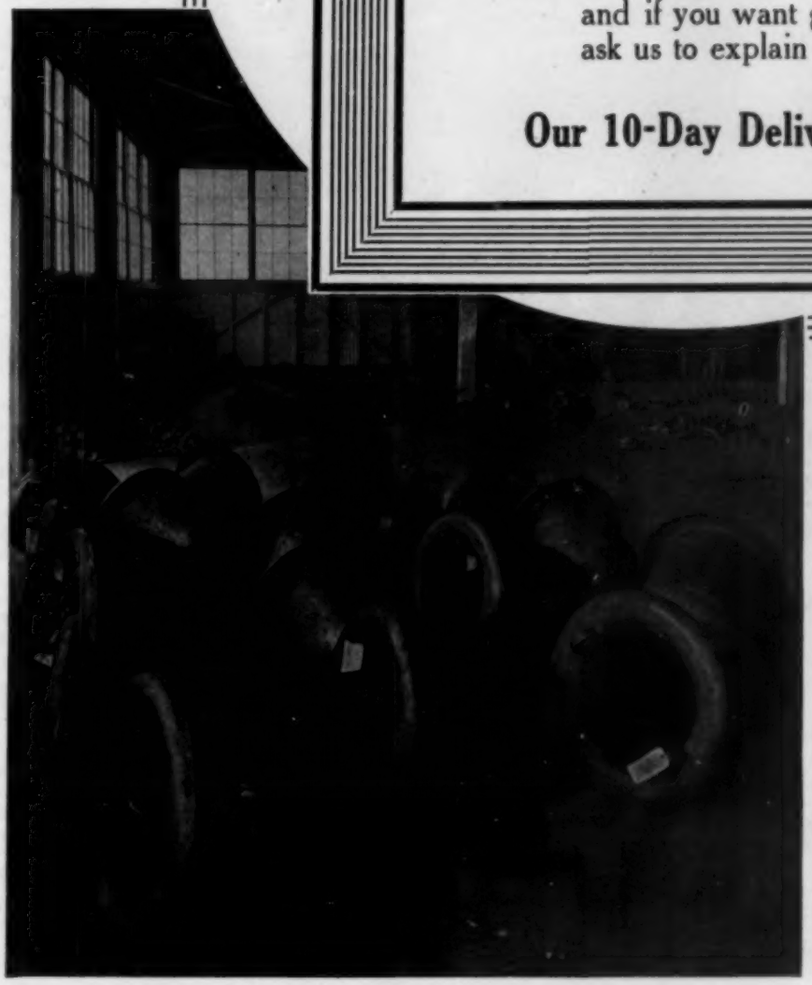
give "Blackwood" products a trial. We make our Boxes and Pots of specially prepared steel

If you are a user of

SUPERFINE STEEL CASTINGS—

and if you want good service, ask us to explain to you

Our 10-Day Delivery Schedule



We also make

Electrical Castings

of the highest Magnetic Permeability, and **Castings** made of **Special Alloys**

Write Us

The Blackwood Steel Foundry Co.

Springfield, Ohio

Guy, secretary, is about to erect a 2-story, 40 x 200-foot plant addition.

ALLENTOWN, PA. — Bethlehem Motors Corporation has let a contract for the erection of a 1-story, 90 x 475-foot plant addition.

CHESTER, PA.—Sun Ship Building Co. is about to erect a 1-story, 35 x 85-foot paint and oil shop.

FARRELL, PA.—The Valley Street Railway Co. plans to spend $200,000 for rebuilding the line from Sharon to West Middlesex.

GLASSMERE, PA.—The Acme Steel Co. has been incorporated with $200,000 capital by G. H. McFetridge, Aspinwall; John T. Rattigan, Homestead; Paul Newcomer, Pittsburgh; J. Frank Peffer, Thomas B. Hepler, Tarentum.

JOHNSTOWN, PA. — Valley Smokeless Coal Co. is about to erect a 1-story, 82 x 96-foot machine shop.

NEW GALILEE, PA.—The Union Coal & Clay Co. has been incorporated with $20,000 capital by Harry R. Beegle, New Galion; Fred N. Beegle, Beaver Falls; George Davidson, E. S. Hoopes, P. J. Davidson, Beaver, Pa.

PHILADELPHIA.—American Metal Works, 314 Armot street, is about to erect a 2-story, 40 x 110-foot manufacturing addition.

PHILADELPHIA. — Hess-Bright Mfg. Co. is about to begin work on the erection of a 1 and 2-story, 80 x 213-foot addition.

PHILADELPHIA. — Philadelphia Gear Works is about to add a 2-story building to its plant.

PHILADELPHIA. — Lawnsdale Steel Co. has let a contract to F. W. Van Loon, Denckla building, for a 1-story, 50 x 111-foot plant here.

PHILADELPHIA. — Electric Service Supplies Co., Seventeenth and Cambria streets, is about to erect a 3-story and basement 60 x 100-foot manufacturing building.

PHILADELPHIA.—F. R. Harris, chief of the bureau of yards and docks, navy department, Washington, is taking bids on the erection of a 1½-story, 150 x 500-foot machine and electrical shop here.

PHILLIPSBURG, PA. — The Standard Steel Process Co. has started to erect an addition to its foundry.

WAYNESBORO, PA.—The Cashman Tool Co. plans to be incorporated with $100,000 capital to manufacture patented reamers.

WILLIAMSPORT, PA.—Sweets Steel Co. is about to erect a 1-story, 40 x 150-foot machine shop.

WILMINGTON, DEL. — The Pusey & Jones Co., ship builder and manufacturer of paper making machinery, has been granted a permit to erect two plant additions 60 x 323 feet and 62 x 109 feet respectively.

BALTIMORE, MD.—Bethlehem Steel Co. is about to erect a smith shop here.

BALTIMORE.—American Refractories Co., 203 South La Salle street, Chicago, is about to erect a $300,000 plant here.

OXFORD, MD.—Chesapeake Machine Co. has been incorporated with $100,000 capital to construct mechanical equipment.

Equipment Needed

The Lightfoot Steel Corporation, M. D. Lightfoot, president, Springfield, Mo., is reported to be inquiring for the following equipment:

One power press.
One upright drill.
Six plain millers.
Two automatic feed millers.
One riveting machine.
One ¾-inch automatic screw machine.
One 12-inch buffer and grinder.
One tumbling barrel.
One 16-inch turning lathe.
One vertical milling machine.
One intermittent milling machine.

Activities in the Central States

AUBURN, N. Y.—Cayuga Tool Steel Co. has let a contract for the erection of a plant here.

BINGHAMPTON, N. Y. — The Security Garage Co., Security Mutual building, plans to erect a 3-story garage, 58 x 83 feet, to cost $30,000. H. Summer Gardner, Ackerman building, is preparing the plans.

BINGHAMPTON, N. Y.—The Binghampton Light, Heat & Power Co., 17 Washington street, plans to erect a garage, storeroom and sub-station, 70 x 80 feet. W. S. Barstow & Co., 50 Pine street, New York City, are the engineers in charge of the work.

BROOKLYN.—Plant of the Atlantic Wire Metal Co., 584 Kent avenue, was badly damaged by fire March 3.

BROOKLYN.—Wickom Automatic Machinery Co. has been incorporated with $25,000 capital to manufacture engines, boilers and factory supplies by E. J. Siess, L. W. Rivers, J. B. Wickery, 3108 Bedford avenue, Brooklyn.

BUFFALO. — The General Electric Co. building, Genesee, Washington and Huron streets, was damaged to the extent of $50,000 by fire recently.

BUFFALO. — The Citizens' Commercial Trust Co., Ellicott square, plans to erect a bank building. Mann & Cook, Dun building, are preparing the plans.

BUFFALO. — The East Buffalo Brewing Co., 300 Emslie street, plans to erect a boiler house. J. C. Schultz, 1370 Main street, is preparing the plans.

BUFFALO.—Thomas McDonnell, 858 Main street, plans to erect a 2½-story garage, 37 x 56 feet, to cost $15,000. Lansing, Bley & Lyman, Prudential building, are preparing the plans.

BUFFALO. — The Schoellkopf Aniline & Chemical Works, 351 Abbott road, has awarded the J. W. Cowper Co., 721 Fidelity building, a contract to erect a 1-story addition to its factory.

BUFFALO. — Westinghouse, Church, Kerr Co., 37 Wall street, New York, has a contract to erect a 1-story, 139 x 28 x 200-foot roundhouse addition here for the Lehigh Valley railroad.

BUFFALO.—Portable Tool Supply Co. has been incorporated with $10,000 capital to manufacture machinery and supplies by D. E. Skellan, J. C. McKendricks, and M. Friel, 287 Norwood avenue, Buffalo.

CORTLAND, N. Y.—The Cortland Savings Bank, 111 Main street, plans to erect a 4-story bank and office building to cost $100,000. Holmes & Winslow, 103 Park avenue, New York, are preparing the plans.

DUNKIRK, N. Y.—Atlas Crucible Steel Co. has completed plans for the erection of a 1-story, 20 x 60-foot producer gas building addition and a 1-story, 69 x 100-foot electrical room.

FALCONER, N. Y.—The Jamestown Mantel Co. is about to erect a 3-story, 50 x 65-foot plant addition.

LOCKPORT, N. Y.—Simonds Mfg. Co. has let a contract for the erection of a 1-story plant addition.

KINGSTON, N. Y.—Emerson Motor Co. is about to erect a 1-story, 100 x 200-foot foundry here.

NIAGARA FALLS, N. Y. — Pollard Machinery Co. has been incorporated with $50,000 capital to manufacture engines, boilers, machine shop, foundry and factory supplies, W. Labombard, M. F. and E. T. Pollard, 910 Perry avenue.

NIAGARA FALLS, N. Y.—The Certain Todd Products Corporation has awarded the Wimmer Construction Co., Victoria building, St. Louis, a contract to erect a factory. Klipstein & Ruthmann, Chemical building, St. Louis, are preparing the plans.

ROCHESTER, N. Y.—North West Brass & Aluminum Co. is about to erect a 2-story, 51 x 70-foot foundry addition.

SCHENECTADY, N. Y. — Mica Insulator Co. has let a contract for the erection of a 3-story plant.

TONAWANDA, N. Y. — Bronzo Alumina Corporation has been organized with $16,000 capital to manufacture aluminum, silicon, bronze, and iron castings by F. A. Redner, J. E. Kaufmann, J. A. Willing, 141 Masten street, Buffalo.

AKRON, O.—The Indian Rubber Co. is receving bids on a 2-story, 60 x 160-foot building which, together with a power plant, will cost $100,000.

ALLIANCE, O. — Transue & Williams Forging Co. has let the contract for a stamping building addition to the Austin Co., Cleveland.

ASHLAND, O.—Ashland Products Co. has been incorporated with $100,000 capital to manufacture plumbing supplies by C. L. Smith, Charles Hoover, Leroy Willour, James Hess, J. W. Brindle.

BATAVIA, O. — Batavia Light & Power Co. has been incorporated with $10,000 capital by Allen B. Nichols, Eli H. Speidel, Percy F. Jamison, M. J. Kain, H. F. Burke.

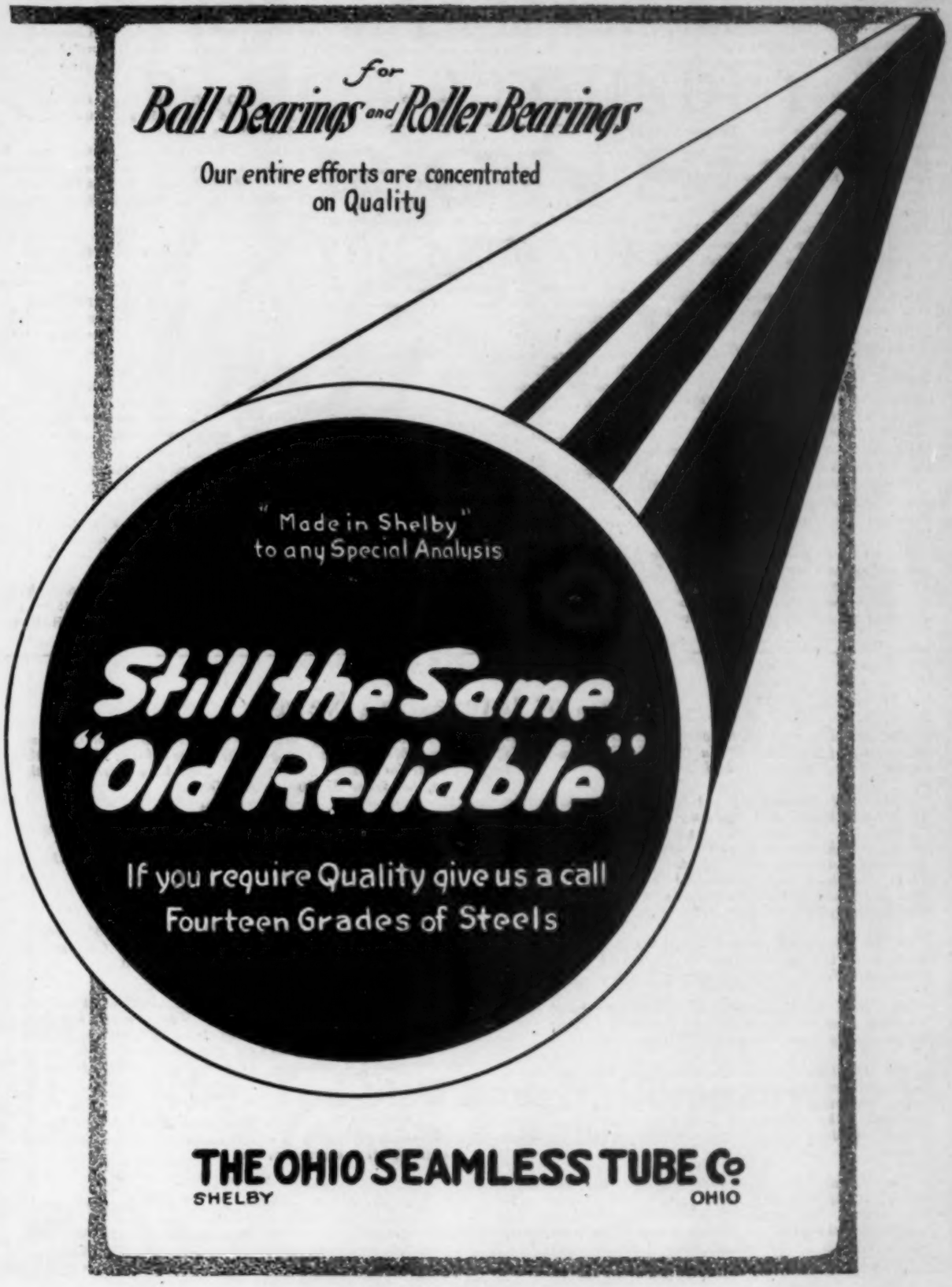
BUCYRUS, O.—The Ryder Brass Foundry

Tools for Firestone

The Firestone Tire & Rubber Co., Akron, has issued a list of equipment to be purchased immediately. All inquiries should be addressed to C. D. Rockwood, purchasing department.

One pipe machine to take from 1 to 4-inch stock.
One pipe machine to take from 4 to 10-inch stock.
Two No. 5 Marvel, or equivalent, hack saws with automatic feeds.
One power grinding head, 2-wheel.
One 42-inch radial drill.
One 24-inch Barnes or equivalent, drill press.
One 16-inch shaper.
One 10-inch screw cutting lathe.
One 16-inch screw cutting lathe.
One bolt cutter, ¾ to 1¼-inch.
One bench drill.

"OHIO SPECIAL"
Cold Drawn Seamless Steel Tubing


for
Ball Bearings and Roller Bearings
Our entire efforts are concentrated on Quality
"Made in Shelby" to any Special Analysis
Still the Same "Old Reliable"
If you require Quality give us a call
Fourteen Grades of Steels
THE OHIO SEAMLESS TUBE Co
SHELBY
OHIO

Say you saw it in THE IRON TRADE REVIEW

Co. is preparing plans for factory additions which will double the capacity of the plant

CANTON, O. — The Weis-McClung Mfg. Co., recently incorporated with $200,000 capital to manufacture vacuum cleaners, plans to erect a plant in Canton or New Philadelphia.

CINCINNATI.—Shott Mfg. Co. has been incorporated with $60,000 capital by Frank M. Shott, Allen T. Shott, Carl Cohn, Chas. H. Gail and John J. O'Connor.

CINCINNATI. — The Cincinnati Concrete Tile & Gravel Co. will build a plant in Evanston two stories, 60 x 100 feet, fireproof construction.

CINCINNATI. — The John Douglas Co., manufacturer of plumbers' supplies, has increased its capital and plans extensive plant improvements. The present plant is located at Carthage, O.

CINCINNATI. — The Southern Machine Mfg. Co. has been incorporated at $20,000 by H. E. Stagman, George D. Haynes, Gerrett J. Frediks Jr., William J. Rieker, Allien Weber.

CLEVELAND.—The Cleveland Welding & Mfg. Co. plans to erect a 1-story, 155 x 341-foot factory.

CLEVELAND. — The Standard Equipment Co. will erect a brick and steel, 100 x 160-foot building.

CLEVELAND.—Weber Brass Co. has been incorporated with $15,000 capital by H. Federman, M. M. Prentice, E. M. Bradley.

CLEVELAND.—The Baxter Gear Cutting & Mfg. Co. is having plans prepared for a 60 x 120-foot, 1-story, structural steel factory.

CLEVELAND.—White Tool & Supply Co. has increased its capital from $15,000 to $25,000.

CLEVELAND.—Stahl Gear & Machine Co. has been incorporated with $50,000 capital by Geo. F. Stahl, Walter L. Stahl, Philip A. Gross, Jessie N. Stahl, John M. Routson.

CLEVELAND.—General Slag Products Co. has been incorporated with $100,000 capital by C. A. Manchester, D. F. Kennedy, John W. Ford, L. A. Manchester, S. S. Conroy.

CLEVELAND — The Monarch Brass Co. has secured a site on East Forty-fifth street which it plans to improve with a $100,000 factory.

CLEVELAND.—The Allen Osborn Co., 957 Rose building, is preparing plans for an $80,000 factory. The name of the plant is not announced.

CLEVELAND.—Cleveland Spring Co. has been incorporated with $50,000 capital by John M. Price, E. L. Ostenderf, Richard F. Edwards, H. Rosecrans, E. E. Maynard.

CLEVELAND.—Yoder Co., maker of machinery, is building an addition to its plant and has purchased ground for further extensions.

CLEVELAND. — The River Furnace Co. plans to erect a $100,000 open-hearth furnace and a pit furnace. Other improvements are planned.

CLEVELAND. — Parsons & Parsons, 5002 Carnegie avenue, are having plans prepared for a 2-story, 46 x 103-foot steel and reinforced concrete factory.

CLEVELAND.—John M. Harris, attorney, represents a Cleveland corporation which recently acquired land and plans to erect a 3-story factory building to be used as a machine shop and warehouse.

CLEVELAND.—Ford Donley Co. has been incorporated with $25,000 capital to manufacture machinery by Ford Donley, Leslie Nichols, Harold G. Mosier, Roger C. Hyatt and Thomas H. Jones.

COLUMBUS, O.—W. E. Lamneck Co. is receiving bids for a new factory to be erected near Fifth avenue and the Hocking Valley railroad.

DAYTON, O.—The Town Hardware Co. is planning to erect a 50 x 200-foot, $25,000 addition to its plant.

DAYTON, O.—Dayton Adding Machine & Time Recorder Co. has been incorporated with $2,000,000 capital by Geo. L. Baker, R. M. Back, M. A. Fanning, R. L. Blagg, J. A. Oswald, et al.

MARYSVILLE, O.—Regent Brass Foundry Co. has been incorporated with $30,000 capital by Joseph J. Klein, Alfred V. Birnbaum, A. J. Hale, S. M. Davis and E. Weinberger.

MT. VERNON, O.—The Pittsburgh Plate Glass Co. plans to improve its plant here by the addition of an artificial gas plant and several oil storage tanks. The improvements will cost $100,000.

NORWALK, O.—The Crucible Steel Co. sustained a loss of $35,000 by the breaking of a fly-wheel of an 800-horsepower engine. Considerable machinery was damaged.

TOLEDO, O.—The Schmidt Parker Co. has a contract to erect a 4-story, 60 x 80-foot, $75,000 machine shop, for the Kent Owens Machine Co.

TOLEDO, O.—Weber Mfg. Co. has been incorporated with $10,000 capital by S. M. Weber, Richard D. Logan, J. A. Weber, Chas A. Weber, A. A. Miller.

WADSWORTH, O. — Wadsworth Foundry Co. has been incorporated with $15,000 capital by Willam F. Ries, William A. Helmick, C.

Santa Fe In Market

The Atchison, Topeka & Santa Fe railroad, N. J. Collins, general purchasing agent, Chicago, is inquiring for the following tools:

One 16-inch crank slotting machine.
Two 32-inch draw cut shapers.
One 600-ton double-end hydraulic car-wheel press.
One 24-inch lathe.
Two planers, 30-inch and 36-inch.

Scraps of Interesting News

The Hendley & Whittemore Co. is the new corporate name of the Slater, Marsden & Whittemore Co., Beloit, Wis., machinist and founder.

* * *

The stove foundry of the Smith & Anthony Co., Wakefield, Mass., was sold at auction Feb. 26. G. A. Gibbey, of the Gibbey Foundry Co., East Boston, Mass., bought the main plant, which consists of seven buildings. Another part of the plant consisting of three buildings was purchased by Samuel Butters. The good will, patterns and manufacturing rights were purchased by the Barstow Stove Co., Providence, R. I.

* * *

H. B. Richmond, Merrill, Wis., has sold his half interest in the Merrill Iron Works to W. V. Taylor, Manawa, Wis.

* * *

The Beal Bros.' factory in Alton and East Alton, Pa., has been purchased by the Hubbard Co., of Pittsburgh, for a sum exceeding $500,000.

* * *

The De Laval Steam Turbine Co., Trenton, N. J., manufacturer of steam turbines and helical reduction gears, centrifugal compressors and similar apparatus, announces the opening of a district sales office in the Smith building, Seattle, in charge of Mr. William Pullen.

* * *

The Lyons Atlas Co., Indianapolis, has purchased the plant, patents and stock parts of the Hume Mfg. Co., Hume, Ill., manufacturer of farm tractors, and will move the plant to Indianapolis. The number of employes will be increased from 1,200 to 1,600.

Stockholders of the Pullau Steel Co., Mount Clemens, Mich., have changed the name of the firm to the Superior Steel Spring Co., and have increased the capital from $75,000 to $140,000.

* * *

The Rumsey Mfg. Co., St. Louis, has been purchased by the Ahrens & Ott Mfg. Co., Louisville, Ky., a subsidiary of the Standard Sanitary Mfg. Co. The Ahrens & Ott company plan to erect additions in St. Louis to cost several thousand dollars.

* * *

The Jackson Shovel & Tool Works, Montpelier, Ind., has been sold by Harry Channon, Chicago, to Hubbard & Co., Pittsburgh, for $40,000.

* * *

The Peck Hardware Mfg. Co., Berlin, Wis., has decided to discontinue business. The concern has been doing an annual business of from $40,000 to $50,000, but the abnormal prices of raw materials, it is stated, have made it advisable to voluntarily retire from the field.

* * *

Articles of dissolution have been filed by the Clinton-Burnham Foundry Co., Milwaukee, which has been inactive for several years.

* * *

The Briggs & Stratton Co., 258 Milwaukee street, Milwaukee, electrical specialties and ignition devices, has increased its capital from $50,000 to $250,000. The company is completing work on its new $125,000 plant.

If You wish to improve your

BASIC and FOUNDRY

IRONS

YOU NEED OUR

Iron Ore

Crawford Ore

Lambert Ore

Pennington Ore

from Our Open Pit Mines

Our iron ores insure ***quality;*** quality means satisfaction; satisfaction means "repeat" orders—and that's what makes a big business and ***keeps*** it big.

"New" business may furnish a living, but it takes the ***"repeaters"*** to bring ***real success.***

The Tod-Stambaugh Company

Perry-Payne Building

CLEVELAND - - OHIO

Say you saw it in THE IRON TRADE REVIEW

C. Patterson, Thomas J. O'Brien, Joseph Burgess, et al.

WARREN, O.—The Freedom Oil Works Co. plant was damaged to the extent of $20,000 by fire.

YOUNGSTOWN, O. — The Heller Bros. Construction Co., at its annual meeting, was authorized to purchase considerable additional equipment.

YOUNGSTOWN, O.—Steel City Welding & Mfg. Co. has been incorporated with $10,000 capital by Fred Griffiths, W. P. Griffiths, H. W. Brunner, G. E. Kerr, Fred J. Warneck.

PARKERSBURG, W. VA.—The Imperial Ice Cream Co. plans to erect a $50,000 plant.

WHEELING, W. VA.—The American Bottle Co. plans to erect a $2,000,000 plant.

IRVINE, KY. — Mid-Continental Oil Co., Harry Sinclair, president, will establish a 1,500,000-barrel, crude-oil tankage plant here to cost $2,500,000 in connection with refinery proposed to be established at Louisville or Cincinnati.

MONTICELLO, KY.—Monticello Electric Light & Power Co. is in the market for a water turbine for 50-foot head to develop 150 horsepower, direct-connected to 6,600-volt, 100-kilowatt generator, with excitor and switchboard.

FORT WAYNE, IND.—The Horton Mfg. Co. has plans for a factory addition 44 x 280 feet to cost $30,000.

GARY, IND.—The Gary Heat, Light & Water Co. plans to erect a 40 x 40-foot electric sub-station to cost $12,000.

LOGANSPORT, IND.—The Wabash railroad soon will build a 20-stall roundhouse and a 750-ton coaling station. The total expenditure will be about $400,000.

MUNCIE, IND. — The Warner Gear Co., manufacturer of automobile parts, will erect additions early in the spring.

RICHMOND, IND.—Superintendent Knecht, of the municipal electric lighting plant, is preparing plans for a dam across the river and a water screen house to be equipped with revolving screens and two 500-horsepower boilers.

CHAMPAIGN, ILL.—E. L. Melton, 602 John street, will build a 10-story dormitory, 116 x 120 feet, to cost $500,000.

CHICAGO. — The Electrical Engineering Equipment Co., 711 Meridian street, has increased its capital from $20,000 to $150,000.

CHICAGO. — The Edward Valve & Mfg. Co. has increased its capital stock $100,000 to $250,000.

CHICAGO.—The Holdfast Nut & Bolt Co. has increased its capital from $1,000 to $150,000.

CHICAGO. — The Duffin Iron Co. has bought a site at Forty-ninth street and Kedzie avenue, and will build a fabricating plant.

CHICAGO.—John A. Taggart, 167 North Clark street, architect, is taking bids on a 9-story hotel, 56 x 103 feet, costing $175,000.

CHICAGO.—The Standard Cap & Seal Co. is building a 4-story plant, 100 x 150 feet, to cost $150,000. Davidson & Weiss, 53 West Jackson boulevard, are architects.

CHICAGO.—The sanitary district of Chicago has plans completed for the Calumet pumping station, 90 x 133 feet, to cost $2,000,000.

CHICAGO.—A contract has been awarded by C. L. Anderson for a 2-story machine shop costing $16,000 at Oakley avenue and Walnut street.

CHICAGO.—Sherman T. Cooper, 111 West Washington street, will build an 11-story hotel, 75 x 125 feet, costing $800,000. H. J. Newhouse, 4630 Prairie avenue, is architect.

CHICAGO.—Chicago Scrap Iron & Machinery Co. has been incorporated with $25,000 capital by A. E. Denstein, Joseph Kamfer, 79 West Monroe street, et al.

CHICAGO.—The Omar Machine Co. has increased its capital stock from $10,000 to $25,000, and has changed its name to the Fulton Machine Tool Co., 1438 Bryan Place.

CHICAGO. — The Peoples Gas Light & Coke Co., 122 South Michigan avenue, is making plans for a gas plant at Thirty-first street and the drainage canal, to cost $30,000,000. J. H. Eustace is engineer.

CHICAGO. — Marshall & Fox, architects, are making plans for a 3-story concrete and steel building 133 x 136 feet, to cost $150,000, for Phillip Folwell, Philadelphia, who will lease it to the Automatic Vending Co., manufacturer of automatic food vending machines.

CHICAGO.—The Redden Motor Truck Co., 1442 South Michigan avenue, has been incorporated with $1,000,000 capital, and will engage in building 1-ton trucks. C. F. Redden is president.

CHICAGO.—H. W. Sisson, 7 South Dearborn street, will build an 11-story hotel, 104 x 170 feet, costing $800,000. H. R. Wilson & Co., 11 South La Salle street, are architects.

EAST ST. LOUIS, ILL.—E. A. Mueller, architect, Arcade building, is making plans for a 10-story hotel to cost $150,000.

MONMOUTH, ILL.—The Boiler Pipe Co. has increased its capital from $100,000 to $150,000.

South of Mason-Dixon Line

BIRMINGHAM, ALA.—The Irondale Foundry & Machine Co. has been incorporated with $10,000 capital to make sash weights, by J. P. Beggs, president; George W. Dyer, secretary and treasurer, et al.

CHATTANOOGA, TENN.—The Vesta Gas Range & Mfg. Co. will erect an addition to its plant.

CHATTANOOGA, TENN.—Charter amendment contemplated by city to provide for an issue of $2,000,000 bonds for purchase and improvement of waterworks plant.

CHATTANOOGA, TENN.—The Ross-Meehan Foundry Co. has plans and specifications for a new annealing shop to be added to its large plant here. The building will be about 140 x 200 feet, and 40 feet high, steel and brick construction.

KNOXVILLE, TENN.—The Knox Stove Works will double its capacity.

MEMPHIS, TENN. — The United States Bedding Co. will erect a factory to cost $50,000. Hanker & Cairns are the architects.

MEMPHIS, TENN.—The Grismore-Hyman Co. is asking for prices on second-hand boilers and dry kiln outfits, proposing to install two or three plants, preferring 150 to 200 horsepower boilers, for slack barrel manufacture and contemplates also erecting an ice plant.

KENTWOOD, LA. — The Kentwood Ice Mfg. & Bottling Works plant was damaged to the extent of $40,000 by fire which started in the engine room.

DALLAS, TEX.—The Dauch Mfg. Co. has been incorporated with $20,000 capital; by S. F. Meyers, and F. W. Rosencraft.

EL PASO, TEX. — The Hills, Sutton & White Mfg. Co., maker of steel products, is building an addition.

EL PASO, TEX.—The H. A. Miller Mfg. Co. is planning to erect a plant at El Paso to manufacture automobile carburetors at a cost of $325,000.

FORT WORTH, TEX.—Texas Everlasting Post Co. has been incorporated with $20,000 capital to manufacture posts, gates and bases by L. M. Barkley, Oscar Menefee and George Mulkey and others, of Fort Worth.

SAN ANTONIO, TEX. — The Southern Welding & Machine Co. has let the contract for a 2-story plant, 60 x 108 feet of reinforced concrete.

Mississippi to the Rockies

CASTLEWOOD, S. D.—Bids will be received until March 7, by William Sours, city clerk, for a water works system, including a 70,000-gallon steel tank, 100-foot tower, 8,000 feet of cast iron pipe, and a pumping station and equipment costing $20,000.

KIMBALL, S. D.—The South Dakota Hydro-electric Corporation, newly formed with $15,000,000 capital will develop water power along the Missouri river in South Dakota. G. W. Adams, Council Bluffs, Iowa, is promoter.

CALDWELL, KAS.—Plans are being prepared by Burns & McDonald, Kansas City, Kas., for a water and electric light plant to cost $80,000.

INDEPENDENCE, KAS. — The Kansas Gas & Electric Co. is making plans for a plant to develop 10,000 kilowatts. J. H. Le Grant, of Wichita, is purchasing agent.

MUNDEN, KAS. — The city council has authorized the construction of an electric light plant to cost $30,000.

TOPEKA, KAS.—The Steel Fixture Mfg. Co. plant sustained a $150,000 fire loss. The plant is a branch of the Capital Iron Works.

TOPEKA, KAS.—The Hossfeld trunk factory was partially destroyed by fire. The loss was about $60,000.

TOPEKA, KAS.—The Steel Fixture Mfg. Co. plant, which was damaged by fire to the extent of $150,000 recently, will be rebuilt at once according to H. K. Brooks, president of the company.

HASKELL, OKLA.—A municipal electric light and power plant will need two 150-horsepower engines, and two 75-kilowatt alter-

nating current generators, to cost about $20,000.

SAPULPA, OKLA.—The St. Louis & San Francisco railroad is making plans for three car repair shops to cost $24,000. F. G. Jonah, St. Louis, is general engineer.

CLIFTON, ARIZ.—Bids will be received up to March 15, by A. J. Kerr, town engineer, for two bridges over the San Francisco river, contajning two spans of 160 feet, and one span of 210 feet. Floors will be creosoted block.

BONNERS FERRY, IDA.—Great Northern railroad will build 5,000 feet of new side track here, costing $15,000 to $20,000.

FORT SMITH, ARK.—The Coal District Power Co. has been incorporated to operate several electric power plants, with $120,000 capital by Hugh Meins, Lawrence, Kansas, and G. W. Skow, Greenwood, Ark.

RISON, ARK.—The county commissioners are considering building a steel bridge over the Saline river near Rison. The Virginia Bridge Co., Memphis, is preparing plans. W. E. Galloway is county judge.

RUSSELLVILLE, ARK. — The DeWitt Mfg. Co. has been incorporated with $15,000 capital. The incorporators are: D. M. DeWitt, president; J. F. Higgins, vice president; W. O. Bonds, secretary and E. G. Butter, treasurer.

CROOKSTON, MINN.—The Pressed Steel Automobile Lug Co. is planning to erect a new plant which will include a foundry.

OWATONNA, MINN. — Bids will be received until March 15, by the city clerk, for a reinforced concrete arch bridge, containing two spans 65 feet long and 50 feet wide to cost $26,000. J. H. A. Brahtz, St. Paul, is the engineer.

BRAZIL, MO. — Brazil Iron & Steel Co. has been incorporated with $50,000 capital to mine coal and iron.

KANSAS CITY, MO.—The Kansas City Light & Power Co., J. H. Lucas, president, has plans ready for bids on the power plant to cost $6,000,000.

SPRINGFIELD, MO.—The Lightfoot Steel Corporation will build a 1-story factory, to cost $10,000.

AUDUBON, IA.—A. Segel, city engineer, is considering the erection of an elevatng tank and tower, and laying of 1,000 feet of water mains.

CLINTON, IA.—Plans are being made for building a water works system and bids will be asked soon. J. G. Thorm is city engineer.

DES MOINES, IA.—The Des Moines Steel Co. has increased its capital from $10,000 to $100,000, and is practically doubling its capacity. J. E. Van Liew is president.

DUBUQUE, IA.—Farley & Loetscher, interior woodwork manufacturers, have awarded a contract to W. J. Fitzgerald, general contractor, Beloit, Wis., for the erection of a 6 and 8-story sash and door plant, 100 x 256 feet in size, and costing about $250,000 with equipment.

IOWA FALLS, IA. — Improvements have been planned for a water works system, including pumps and motors. E. H. Marriage is city manager.

KEOKUK, IA.—The Peckstein Iron Works plans to build a modern steel and brick plant early in the spring.

MARSHALLTOWN, IA. — The Central Foundry Co. is building an addition.

MESSENA, IA.—A 50,000-gallon steel tank on a 78-foot tower will be built and 24 blocks of water mains laid by the city.

The Pacific Coast States

CAMAS, WASH.—A bond election will be held soon to provide $100,000 for a water works, reservoir, and distributing system. Plans and estimates have been made by L. B. Wickersham, consulting engineer, Portland, Ore.

CENTRALIA, WASH. — Doty Lumber & Shingle Co. will install a 600-horsepower engine at its plant.

HARRINGTON, WASH. — Dunning & Erich, manufacturers, of harvesters, will incorporate and make considerable extensions.

INDEX, WASH.—G. N. Miller & Son, Arcade building, Seattle, have started final survey for proposed power plant and water system here to cost $20,000. About 4,500 feet of wood and riveted steel pipe will be used.

MT. VERNON, WASH.—The Mt. Vernon Milk Co. will build a power house 50 x 100 feet and a plant 100 x 210 feet, costing $150,000.

SEATTLE.—J. F. Duthie & Co. have contracts for two 8,800-ton steel freighters for the Cunard Steamship Co. to cost about $1,000,000. Ames Ship Building & Dry Dock Co. has closed a contract with the Cunard line for nine steel freighters the total cost of which will be about $11,000,000.

SPOKANE, WASH.—Porter Bros. have contracts for constructing a line for Spokane, Portland & Seattle railroad amounting to $75,000 and for the Spokane & Inland Empire railroad to amount to $35,000.

TACOMA.—The Pacific Steel & Boiler Co. is having plans prepared for an addition. O. T. Nelson is president.

TACOMA.—Keystone Cereal Co. will erect a flour mill here with capacity of 400 barrels a day. It will cost $130,000. Machinery will cost $50,000.

TACOMA.—County is preparing to construct two bridges, one, a bascule bridge over Hylebos creek and steel span over Nisqually river, latter to cost $22,000.

LA GRANDE, ORE.—The Oregon-Washington Railway & Navigation Co. will build a viaduct at Second street to cost $30,000, plans having been accepted by the city.

PORTLAND, ORE. — The Columbia Ship Building Co. will build a machine shop.

PORTLAND, ORE.—The Albina Engine & Machine Works is erecting a $21,000 building to be used for a machine shop.

PORTLAND, ORE.—David Eccles, Ogden, Utah, who recently purchased timber to extent of $4,000,000 near here, is to develop it by improving mills and constructing railroads at a cost of $1,000,000.

CALEXICO, CAL.—H. L. Sherman, city engineer, is making plans for a steel bridge at Second street to cost $12,000.

CHICO, CAL.—The city of Chico plans a municipal power plant at Deer Creek, at a cost of $600,000. William Robbie is mayor.

LOS ANGELES. — The Axelson Machine Co. is making extensive improvements which include a 130 x 375-foot machine shop, a 100 x 155-foot foundry, a 25 x 80-foot pattern shop, a 25 x 80-foot pattern storage building, a 25 x 75-foot forge shop, a 25 x 100-foot office building and a 25 x 100-foot garage.

SACRAMENTO, CAL. — The construction of a municipal power plant at Deer creek, Tehama county, at a cost of $600,000, has been recommended to the city of Chico, Butte county.

SAN FRANCISCO.—The General Machinery & Supply Co., 39 Stevenson street, will build a 2-story brick factory. E. T. Foulks, Crocker building, is architect.

The Dominion of Canada

JOGGINS, N. S.—The Maratime Coal, Railway & Power Co. is in the market for electric mining equipment, etc.

SPRINGHILL, N. S.—Malcolm Blue, North Slope, is in the market for steam power pumps, fans, cables, drums, hauling outfit, tracks, etc., for a mining concern.

MONTREAL, QUE. — Construction work will be commenced at once on the erection of an $80,000 plant for the manufacture of metal goods of all kinds for the Thomas Davidson Manufacturing Co. A. F. Byers Co., 340 University avenue, is contractor.

TROIS RIVIERES, QUE. — La Fonderie d'Acier des Trois Rivieres will build a $100,000 addition to its foundry. William Schand is the architect.

BELLEVILLE, ONT.—The Maple Leaf Tires Co. is erecting a plant at Belleville at a cost of $100,000, and will be shortly ready for the installation of equipment. O. W. Dunham is secretary.

HAMILTON, ONT. — The Union Drawn Steel Co. proposes to build a large factory in connection with its present plant.

HAMILTON, ONT.—The Spectator Printing Co. is having plans prepared by McPhie & Kelly, Bank of Hamilton building, for a 10-story office building to cost $1,000,000.

KINCARDINE, ONT.—The F. E. Combe Furniture Co. is in the market for a 60 to 100 horsepower wheel-lock, stationary engine.

LONDON, ONT.—John A. Moody is in the market for power metal-stamping machines, etc.

PETERBORO, ONT. — The Quaker Oats Co., 34 Hunter street, has secured a plant at London, and proposes to spend $100,000 on addition and equipment.

TORONTO, ONT.—Construction work has been started on the erection of a new plant on Dufferin street for the Aeroplanes Co. The plant will cost $500,000.

EDMONTON, ALTA.—The Western Shell & Box Co. is in the market for an 18-inch engine lathe, about 4-inch belt, for heavy duty; also universal milling machine and dividing head.

LADYSMITH, B. C. — The Ladysmith Smelter Co. will spend $100,000 on additions to its smelter at Ladysmith. W. J. Watson is superintendent of the plant.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

Bessemer valley	$36.00 to 37.00
Bessemer, Pittsburgh	36.95
Basic, Pittsburgh	32.95
Basic, eastern Pa.	34.00 to 35.00
Basic, Buffalo	37.50 to 40.00
Malleable, Pittsburgh	35.95 to 38.95
Malleable foundry, Chicago	36.00 to 37.00
Malleable foundry, Philadelphia	38.00 to 39.00
Malleable foundry, Buffalo	37.50 to 40.00
No. 1X foundry, Philadelphia	37.50 to 38.00
No. 2 foundry, Pittsburgh	35.95 to 38.95
No. 2 foundry, Cleveland	36.30 to 38.30
No. 2 foundry, Ironton	35.00
No. 2 foundry, Chicago	35.50 to 36.00
No. 2X foundry, Philadelphia	36.50 to 37.50
No. 2X foundry, N. J. tidewater	36.50 to 37.50
No. 2X foundry, Buffalo	37.50 to 40.00
No. 2 plain, Philadelphia	36.00 to 36.50
No. 2 plain, N. J. tidewater	36.00 to 36.50
No. 2 plain, Buffalo	35.00
No. 2 southern, Birmingham	27.00 to 30.00
No. 2 southern, Cincinnati	29.90 to 32.90
No. 2 southern, Chicago	31.00 to 34.00
No. 2 southern, Phila. delivery	31.00 to 32.00
No. 2 southern, Cleveland	29.00 to 31.00
No. 2 southern, New York docks	30.25 to 31.25
No. 2 southern, Boston docks	31.00 to 33.00
No. 2 south. interior, New Eng.	31.00 to 33.00
No. 2 southern, St. Louis	27.40 to 31.40
Virginia, No. 2X furnace	34.00 to 36.00
Virginia, No. 2X, Philadelphia	36.75 to 38.75
Virginia, No. 2X, Jersey City	37.00 to 39.00
Virginia, 2X, Boston points	37.25 to 39.25
Gray forge, eastern Pa.	34.00 to 34.50
Gray forge, Pittsburgh	31.95 to 32.95
Gray forge, Birmingham	26.00
Silveries, 8 per cent, furnace	40.00
Silveries, 8 per cent, Chicago	42.00
Low phos. Standard, Phila.	62.00 to 65.00
Low phos. Lebanon, Pa., furnace	60.00 to 65.00
Low phos., Pittsburgh	60.00 to 61.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	36.75 to 37.75
Charcoal, Buffalo	40.00 to 42.00
Charcoal, Birmingham	27.00 to 28.00

IRON ORE

Lake Superior Ores.	Lower Lake Ports.
Old range Bessemer, 55 per cent, ton	5.95
Messabi Bessemer, 55 per cent, ton	5.70
Old range non-Bes., 51½ per cent, ton	5.20
Mesabi non-Bess., 51½ per cent, ton	5.05

Port Henry Ores. Per unit delivered eastern Pa. All non-Bessemer.

Old Bed, crude, 58 per cent	10.50c to 11.00c
Old Bed, concent., 65 per cent.	11.00c to 11.50c
Harmony concent., 63 per cent.	11.50c to 11.75c
Lump (at mines)	$5.75

COKE

(At the ovens.)

Connellsville furnace	$10.00
Connellsville fur., cont., 1st half	8.00 to 8.25
Connellsville foundry, 2nd half	6.75 to 7.50
Connellsville foundry, 1st half	9.00 to 10.00
Connellsville foundry	11.00 to 12.00
Wise county furnace, contract	7.00 to 9.00
Wise county foundry, contract	7.50 to 11.00
Pocahontas foundry, contract	7.50 to 11.00
Pocahontas furnace, contract	7.00 to 9.00
New River foundry, contract	8.50 to 11.00
New River furnace, contract	7.50 to 9.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, delivered prompt	$275 to 285
Ferro manganese, 80 per cent, seaboard and deliv'd, contract.	185 to 250
Spiegel, 20 per cent furnace by July	75.00 to 80.00
Spiegel, 20 per cent, furnace, last half	60.00 to 65.00
Ferro-silicon, 50 per cent, Pbgh., nominal	175 to 225

Bessemer ferro-silicon, 9 per cent to 10 per cent, $46.00; 10 to 11 per cent, $47.00; 11 to 12 per cent, $48.00; 12 to 13 per cent, $49.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila	$65.00
Forging billets, Phila	90.00 to 100.00
Forging billets, Pbgh., nominal	90.00 to 100.00
Forging billets, Chicago	70.00
Wire rods, Pittsburgh	75.00 to 85.00
Bessemer billets, Youngstown	65.00 to 67.50
Bessemer billets, Pittsburgh	$65.00 to 67.50
Open hearth billets, Pittsburgh	65.00 to 67.50
Open hearth billets, Youngstown	65.00 to 67.50
Bess. sheet bars, Youngstown	65.00 to 67.50
Op. h'th sheet bars, Youngstown	65.00 to 67.50
Bess. sheet bars, Pittsburgh	65.00 to 67.50
Open hearth sheet bars, Pbgh.	65.00 to 67.50
Muck bars, Pittsburgh (nominal)	50.00
Grooved steel skelp	3.60c
Sheared steel skelp	4.50c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bes. rails, Pbgh. & Chgo.	$38.00
Stan. op-h'th rails, Pbgh. & Chgo.	40.00
Light rails, 8 to 10 lbs., Pbgh.	53.00
Light rails, 8 lb., Chicago	55.00
Light rails, 12 to 14 lbs., Pbgh.	52.00
Light rails, 12 lbs., Chicago	54.00
Light rails, 16 to 20 lbs., Pbgh.	51.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—

Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to: —	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (all rail)	6.15
New York (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54
Duluth, Minn., to:—	
Minneapolis-St. Paul	$1.25
Mayville, Wis.:—	
Minneapolis-St. Paul	$1.75

Light rails, 16 to 20 lbs., Chgo.	53.00
Light rails, 25 to 45 lbs., Pbgh.	50.00
Light rails, 25 to 45 lbs., Chgo.	52.00
Relaying rails, standard, Pbgh. and Chicago	$33.00 to 34.00
Relaying rails light, Chicago	34.00 to 35.00
Angle bars, st. sect., Pbgh. base	2.25c to 2.75c
Angle bars st. sections, Chgo.	2.25c to 2.75c
Spikes, railroad, Pittsburgh	3.40c to 3.50c
Spikes, railroad, Chicago	3.60c
Track bolts, Pittsburgh	4.60c to 4.75c
Track bolts, Chicago	4.50c to 4.60c
Tie plates, Chicago	$60.00 to 65.00

SHAPES, PLATES AND BARS

Structural shapes, con. Pbgh.	3.60c
Structural shapes, Philadelphia	3.759c to 4.159c
Structural shapes, New York	3.769c to 4.169c
Structural shapes, Chicago	3.79c to 4.50c
Tank plates, Chicago	4.69c to 6.50c
Tank plates, Pittsburgh (con.)	4.50c to 5.75c
Tank plates, Pittsburgh	4.75c to 5.50c
Tank plates, Philadelphia	4.659c to 5.659c
Tank plates, New York	4.669c to 5.669c
Bars, soft steel, Chicago	3.54c to 4.00c
Bars, soft steel, con. Pbgh.	3.35c
Bars, soft steel, New York	3.519c to 3.669c
Bars, soft steel, Philadelphia	3.509c to 3.659c
Hoops, carloads, Pbgh. contr.	4.10c to 4.25c
Hoops, Pittsburgh	4.25c to 4.50c
Bands, Pittsburgh	4.10c to 4.35c
Bands, Pittsburgh (contr.)	3.35c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chicago	3.00c
Bar iron, Philadelphia	3.659c
Bar iron, Cleveland	3.00c
Bar iron, New York	3.669c
Bar iron, Pittsburgh	3.25c to 3.50c
Hard steel bars, Chicago	3.25c

SHEETS

(In cents per pound.)

(Open hearth material takes 10c above prices of bessemer.)

SHEET MILL BLACK.

Gage.	Bessemer.
17 to 21	4.80 to 5.65
22 to 24	4.85 to 5.70
25 and 26	4.90 to 5.75
27	4.95 to 5.80
28	5.00 to 5.85
29	5.05 to 5.90
30	5.15 to 6.00

TIN MILL BLACK.

Gage.	Bessemer.
15 and 16	4.80 to 5.65
17 to 21	4.85 to 5.70
22 to 24	4.90 to 5.75
25 to 27	4.95 to 5.80
28	5.00 to 5.85
29 and 30	5.05 to 5.90
30½ and 31	5.05 to 5.95

GALVANIZED.

Gage.	Bessemer.
10 and 11	5.75 to 6.50
12 to 14	5.85 to 6.60
15 and 16	6.00 to 6.75
17 to 21	6.15 to 6.90
22 to 24	6.30 to 7.05
25 and 26	6.45 to 7.20
27	6.50 to 7.35
28	6.75 to 7.50
29	6.95 to 7.70
30	7.15 to 7.90

BLUE ANNEALED.

Gage.	Bessemer.
3 to 8	4.75 to 5.25
9 to 10	4.75 to 5.25
11 to 12	4.75 to 5.25
13 and 14	4.75 to 5.25
15 and 16	4.75 to 5.25

No. 28 black, Chicago	5.19c to 5.44c
No. 28 galvanized, Chicago	6.75c to 7.50c
No. 10 blue annealed, Phila	4.909c to 5.159c
No. 10 blue annealed, Chicago	4.94c to 5.19c

TIN PLATE

Tin plate, 100 lb., coke base, contract	7.50c to 8.50c
Tin plate, coke base, prompt	8.25c to 8.75c
Terne plate I. C.	6.00c
Terne plate, long	7.00c to 7.50c

IRON AND STEEL PIPE

(Prices adopted March 5, 1917.)

Steel.

Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
⅛, ¼ and ⅜, butt	53	26½
½, butt	57	42½
¾ to 3, butt	60	46½
2, lap	53	40½
2½ to 6, lap	56	43½
7 to 12, lap	53	39½
13 and 14, lap	43½	....
15, lap	41	....

Iron.

(Prices adopted March 5, 1917.)

Standard weight, threads and couplings, diam. in inches.	Black. Per cent off.	Galv. Per cent off.
⅛ and ¼, butt	42	15
⅜, butt	43	16
½, butt	47	29
¾ to 1½, butt	50	34
1¼, lap	35	20
1½, lap	42	28
2, lap	43	29
2½ to 6, lap	45	32
7 to 12, lap	44	31

BOILER TUBES

(Price adopted Nov. 20, 1916.)

Steel, 3½ to 4½ inches, l. c. l.	46
Iron, 3½ to 4½ inches l. c. l.	36

IRON AND STEEL PRICES

Corrected up to Tuesday noon

WIRE PRODUCTS

(Adopted March 5, 1917.)
(Retailers' prices 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$3.20
Coated nails	3.10 to 3.15
Plain wire, jobbers', Pittsburgh	3.15
Galvanized wire, jobbers', Pbgh	3.85
Polished staples, Pbgh	3.35
Galvanized staples, Pbgh	4.05
Barb wire, painted, jobbers', Pbgh.	3.35
Barb wire, galv., jobbers', Pbgh.	4.05

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 40 and 10; cut threads, 40 and 2½, larger or longer, 30 and 5.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter rolled 50; cut, 40 and 10; larger or longer, 35 and 5.

Cold pressed, semi-finished hexagon nuts, 50, 10 and 5.

Gimlet and cone point lag bolts, 50. Hot pressed square nuts, blanks, $2.50 off; tapped $2.30 off. Hot pressed hexagon nuts, blank, $2.50 off; tapped, $2.30 off.

Cold pressed square nuts, blank, $2.10 off; tapped, $1.90 off. Cold pressed hexagon nut, blank, $2.25 off; tapped, $2.00 off.

RIVETS

Structural rivets, Pbgh	4.50c
Boiler rivets, Pbgh	4.85c

Tinner's rivets, 40 and 10 off, Pittsburgh.

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	3.35c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	6.50c

COLD ROLLED STRIP STEEL

Base price, 7.00c to 8.00c per 100 pounds, hard, coils 1½ inches and wider and by .100 inch and heavier.

CAST IRON WATER PIPE

Steel bars, Chicago	4.00c
Six-inch and larger, Chicago	42.50
Six-inch Class B, New York	41.50
Four-inch Class B, New York	44.50
Four to six-inch Birmingham	40.00
Six-inch and larger, Birmingham	37.50

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	4.00c
Steel squares, 2-in. & ov., Cleve.	4.50c
Steel bars, und. 2 in., Cleveland	4.00c
Steel rounds, 2-in. & ov., Cleve.	4.50c
Steel bars, Detroit	3.75c
Steel bars, Philadelphia	4.35c
Steel bars, New York	4.35c
Steel bars, St. Louis	4.05c
Steel bars, Cincinnati	4.15c to 4.45c
Steel bars, St. Paul	4.10c
Steel bars, over 2-in., Buffalo	4.50c
Steel bars, Buffalo	4.40c
Iron bars, Chicago	4.00c
Iron bars, Cleveland	3.95c
Iron bars, Detroit	3.75c
Iron bars, St. Louis	3.75c
Iron bars, Cincinnati	4.15c to 4.45c
Iron bars, Philadelphia	4.00c to 4.25c
Iron bars, New York	4.00c to 4.25c
Shapes, Chicago	4.25c
Shapes, Detroit	4.00c
Shapes, St. Louis	4.30c
Shapes, St. Paul	4.35c
Shapes, New York	4.50c
Shapes, Cleveland	4.10c
Shapes, Philadelphia	4.50c
Shapes, Buffalo	4.60c
Shapes and plates, Cincinnati	4.40c to 5.50c
Plates, Chicago	5.50c
Plates, Detroit	4.75c
Plates, St. Louis	5.55c
Plates, St. Paul	5.60c
Plates, New York	5.50c
Plates, Cleveland	5.00c
Plates, Philadelphia	5.50c
No. 10 blue anl. sheets, Chicago	5.50c
No. 10 blue anl. sheets, Clevel'd	5.25c
No. 10 blue anl. sheets, Buffalo	4.50c
No. 10 blue anl. sheets, St. L.	5.55c
No. 10 blue anl. sheets, Cinci.	5.50c
No. 10 blue anl. sheets, St. Paul	5.60c
No. 10 blue anl. sheets, Detroit	5.25c
No. 28 black sheets, Chicago	5.65c
No. 28 black sheets, Cleveland	5.75c
No. 28 black sheets, Cincinnati	5.50c
No. 28 black sheets, Detroit	5.40c
No. 28 black sheets, St. Louis	5.70c
No. 28 black sheets, St. Paul	5.75c
No. 28 galv. sheets, Chicago	7.50c
No. 28 galv. sheets, Cleveland	7.25c
No. 28 galv. sheets, Cincinnati	7.50c
No. 28 galv. sheets, Detroit	7.50c
No. 28 galv. sheets, St. Louis	8.00c
Hoops, Cleveland	5.00c
Hoops, Detroit	4.50c

Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.

Pure benzol	$0.55 to .60
Toluol	1.75 to 2.00
Solvent naphtha	.18 to .23

Per Pound at Producers Plant.

Phenol	$0.45

Per 100 Pounds at Seaboard.

Sulphate of ammonia	$4.30 to 4.35

Contract.

Per Gallon at Producers Plant.

Pure benzol	$0.55 to .60
Toluol	1.75
Solvent naphtha	.16 to .20

Per Pound at Producers Plant.

Phenol (nominal)	$0.45

Per 100 Pounds at Seaboard.

Sulphate of ammonia	no market

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$28.00 to 28.50
Angle bars, steel, St. Louis	23.25 to 23.75
Arch bars and transoms, St. L.	30.00 to 30.50
Arch bars and transoms, Chgo.	28.50 to 29.00
Cast, No. 1, St. Louis	15.00 to 15.50
Boiler plate, cut, No. 1, Chgo.	15.00 to 15.50
Boiler plate, cut, No. 1, St. L.	13.00 to 13.50
Boiler punchings, Chicago	20.00 to 21.00
Bundled sheet, Cincinnati	12.50 to 13.00
Busheling, No. 1, Chicago	16.50 to 17.00
Busheling, No. 1, Cincinnati	14.25 to 14.75
Busheling, No. 1, Cleveland	18.00 to 18.50
Busheling, No. 1, St. Louis	17.50 to 18.00
Busheling, No. 2, Chicago	12.25 to 12.75
Cast borings, Cincinnati	8.25 to 8.75
Cast borings, Cleveland	9.00 to 9.25
Cast borings, St. Louis	9.50 to 9.75
Cast borings, Chicago	9.25 to 9.75
Cast, No. 1, Chgo.	16.00 to 16.50
Cast, No. 1, Cincinnati	16.25 to 16.75
Cast, No. 1, Cleveland	20.00 to 21.50
Cast, No. 1, St. Louis	16.50 to 17.00

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	24.50 to 25.00
Grate bars, Cleveland	13.00 to 13.25
Iron axles, St. Louis	34.50 to 35.00
Iron axles, Cleveland	43.00 to 44.00
Knuckles, coup., Chicago	24.00 to 24.50
Knuckles, coup., St. Louis	26.00 to 26.50
Locomotive tires, Chicago	34.00 to 35.00
Locomotive tires, St. Louis	33.00 to 33.50
Machine shop turnings, Chicago	9.50 to 10.00
Machine shop turnings, Cleveland	9.00 to 9.25
Machine shop turn'gs, Cincinnati	8.25 to 8.75
Machine shop turn'gs, St. Louis	9.50 to 10.00
Malleable agricultural, Chgo.	15.25 to 15.75
Malleable agricultural, St. Louis	16.00 to 16.50
Malleable, Cincinnati	12.75 to 13.25
Malleable railroad, Chicago	18.00 to 18.50
Malleable railroad, St. Louis	17.50 to 18.00
Pipes and flues, Cleveland	14.75 to 15.25
Pipes and flues, Chicago	14.75 to 15.25
Pipes and flues, St. Louis	16.00 to 16.50
Railroad wrought, No. 1, Cleve.	25.00 to 25.50
Railroad wrought, No. 1, Chgo.	26.00 to 26.50
Railroad wrought, No. 1, Cinci.	19.25 to 20.00
Railroad wrought, No. 1, St. L.	26.50 to 27.00
Railroad wrought, No. 2, Chgo.	25.00 to 26.50
Railroad wrought, No. 2, St. L.	25.50 to 26.00
Shafting, St. Louis	24.00 to 25.00
Springs, Chicago	24.25 to 24.75
Steel car axles, St. Louis	36.00 to 36.50
Steel car axles, Chgo.	35.00 to 36.00
Stove plate, Chicago	12.00 to 12.50
Stove plate, Cleveland	12.25 to 13.00
Stove plate, Cincinnati	10.25 to 10.75
Stove plate, St. Louis	12.00 to 12.50

(Gross Tons.)

Axle turnings, Cleveland	$16.50 to 16.75
Axle turnings, Buffalo	16.50 to 17.00
Busheling, No. 1, Buffalo	20.50 to 21.50
Busheling, No. 1, Pittsburgh	16.50 to 17.25
Busheling, No. 2, Buffalo	13.00 to 13.50
Bundled sheets, Pittsburgh	14.75 to 15.50
Bundled sheets, Cleveland	14.50 to 15.00
Bundled sheets, Buffalo	15.00 to 15.50
Car wheels, (iron), Pittsburgh	22.50 to 23.00
Car wheels, (steel), Pittsburgh	27.00 to 28.00
Car wheels, Chicago	20.25 to 20.75
Car wheels, eastern Pa.	21.00 to 22.00
Car wheels, Buffalo	23.00 to 23.50
Car wheels, New York	19.00 to 20.00
Car wheels, St. Louis	19.50 to 20.00
Car wheels, Birmingham	16.00 to 16.50
Car wheels, Cleveland	19.50 to 20.00
Tram car wheels, Birmingham	14.50 to 15.00
Cast borings, New York	12.50 to 13.00
Cast borings, eastern Pa.	14.50 to 15.00
Cast borings, Buffalo	12.00 to 12.50
Cast borings, Pittsburgh	12.00 to 12.50
Cast, No. 1, eastern Pa.	22.00 to 23.00
Cast, No. 1, Pittsburgh	21.50 to 22.50
Cast, No. 1, Birmingham	16.00 to 17.00
Cast, heavy, No. 1, N. J. points	20.50 to 21.00
Forge flash'gs, un. 10 in., Cleve.	19.50
Forge flash'gs, ov. 10 in., Cleve.	17.00
Forge, No. 1, eastern Pa.	16.00 to 16.50
Frogs, switches, guards, St. L.	25.00 to 25.50
Grate bars, Buffalo	15.00 to 15.50
Grate bars, N. J. points	13.50 to 14.00
Heavy melting steel, Pittsburgh	23.00 to 24.00
Heavy melting steel, Buffalo	24.00 to 24.50
Heavy melting steel, Chgo.	23.00 to 23.50
Heavy melting steel, Cleveland	22.75 to 23.50
Heavy melting steel, Cincinnati	22.00 to 23.00
Heavy melting steel, eastern Pa.	23.50 to 24.00
Heavy melting steel, New York	21.50 to 22.00
Heavy melting steel, St. L.	26.00 to 26.50
Heavy melting steel, Birmingham	16.50 to 17.00
Hydraulic pressed sheet, Clevel'd	18.50 to 19.00
Hydraulic pressed sheets, Pbgh.	19.00 to 19.50
Hydraulic pressed sheets, Chgo.	17.00 to 17.50
Iron rails, Chicago	28.50 to 29.00
Iron rails, Buffalo	25.00 to 26.00
Iron rails, Cincinnati	25.50 to 26.50
Iron rails, St. Louis	27.00 to 27.50
Iron rails, Cleveland	29.00
Iron axles, Pittsburgh	39.00 to 41.00
Iron axles, Cincinnati	41.50 to 42.50
Iron axles, eastern Pa.	38.00 to 40.00
Iron axles, Chicago	38.00 to 39.00
Iron axles, Buffalo	45.00
Low phos. steel, Buffalo	33.00 to 36.00
Low phos. steel, Pittsburgh	33.00 to 35.00
Low phos. steel, eastern Pa.	33.00 to 35.00
Machine shop turnings, Buffalo	10.25 to 10.75
Mch. shop turnings, New York	11.75 to 12.25
Mch. shop turnings, Pittsburgh	12.00 to 12.50
Mch. shop turnings, eastern Pa.	14.00 to 14.50
Mch. shop turnings, Birmingham	8.00 to 8.50
Malleable railroad, Cleveland	21.00 to 21.50
Malleable railroad, Buffalo	22.00 to 23.00
Malleable railroad, Pittsburgh	21.00 to 22.00
Malleable railroad, eastern Pa.	17.50 to 18.00
R. R. and mch. cast, No. 1, Bfl.	22.50 to 23.00
R. R. wrought, No. 1, Buffalo	28.00 to 29.00
R. R. wrgt., No. 1, eastern Pa.	30.00 to 31.00
City wrought, New York	20.00 to 21.00
R. R. wrought, No. 1, Pbgh.	22.00 to 23.00
D. R. wrought, No. 1, B'ham.	18.00 to 18.50
Reroll. rails, 5 ft. & ov., Pbgh.	29.00 to 30.00
Reroll. rails, 5 ft. & ov., Chgo.	27.00 to 27.50
Reroll. rails, 5 ft. & ov., E. Pa.	27.00 to 28.00
Reroll. rails, 5 ft. and ov., St. L.	28.00 to 28.50
Shafting, New York	26.00 to 27.00
Shafting, eastern Pa.	28.00 to 29.00
Shoveling steel, Chgo.	19.50 to 20.00
Shoveling steel, St. Louis	18.50 to 19.00
Steel rails, short, Chicago	25.50 to 26.00
Steel rails, short, Cleveland	23.50 to 24.00
Steel rails, over 6 ft., Cleveland	21.50 to 21.75
Steel rails, old, Birmingham	18.00 to 18.50
Steel rails, short, St. Louis	25.00 to 25.50
Steel car axles, Birmingham	35.00 to 36.00
Steel car axles, New York	38.00 to 40.00
Steel car axles, Buffalo	45.00
Steel car axles, Cleveland	43.50 to 44.00
Steel car axles, Pittsburgh	39.00 to 41.00
Steel car axles, eastern Pa.	38.00 to 40.00
Stove plate, N. J. points	14.00 to 14.50
Stove plate, Birmingham	11.00 to 11.50
Stove plate, Buffalo	15.00 to 15.50
Stove plate, eastern Pa.	17.00 to 17.50
Stove plate, Pittsburgh	15.00 to 15.50
Wrought pipe, Buffalo	19.50 to 20.50
Wrought pipe, eastern Pa.	19.50 to 20.50
Wrought pipe, New York	17.50 to 18.50

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Central Steel Co., The, Massillon, O.
Haynes Stellite Co., The, Kokomo, Ind.
Standard Alloys Company, Pittsburgh, Pa.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Alloys Steel Corp., The, Canton, O.

ALUMINUM (Granulated).
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM (Solder).
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM (Vanadium).
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM INGOTS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS (Sheet).
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ANGLES, TEES, CHANNELS (See Steel, Structural).

ANNEALING BOXES AND POTS.
Blackwood Steel Fdy. Co., The, Springfield, O.
Knox Pressed & Welded Steel Co., Pittsburgh.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

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American Bridge Co., New York City.

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Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
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Witherow Steel Co., Pittsburgh, Pa.

BARS (Iron and Steel).
American Bridge Co., New York, N. Y.
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American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bingham, W., Co., The, Cleveland, O.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Company, Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
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Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
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Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Alloys Steel Corp., The, Canton, O.
Upson Nut Co., Cleveland, O.
Westerman & Co., Lockport, N. Y.

BARS (Tin).
Andrews Steel Co., Newport, Ky.

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American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
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Carnegie Steel Co., Pittsburgh, Pa.
Empire Art Metal Co., College Pt., N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

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New Departure Mfg. Co., Bristol, Conn.

BEARINGS (Vanadium Steel).
American Vanadium Co., The, Pittsburgh, Pa.

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Texas Company, The, New York City.

BELT LACING (Leather).
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Graton & Knight Mfg. Co., Worcester, Mass.

BELTING (Chain).
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BELTING (Leather).
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